LEIBNIZ

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EDITED BY

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LEIBNIZ

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LEIBNITZ.

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LEIBNIZ

BY

JOHN THEODORE MERZ

WILLIAM BLACKWOOD AND SONS
EDINBURGH AND LONDON
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PREFACE.

In the following discussion of the character of Leibniz and the spirit of his philosophy, I have endeavoured to confine myself as much as possible to those points in the life and the doctrine which cannot be easily gathered by a perusal of Guhrauer's biography (Berlin, 1846), of the principal works of the philosopher himself, or of the well-known historical treatises of Ueberweg, Kuno Fischer, Erdmann, and Zeller. These I have supposed to be of easy access, and I express the hope that those of my readers who have not read them may be better prepared by this volume to do so, and that those who have read them may find something in it, which the larger works did not readily supply.

None of the many editions of the works of Leibniz is complete; and none can as yet be dispensed with. The following are the principal editions:—

I. 'Gothofredi Guillelmi Leibnitii opera omnia, nunc primum collecta studio Ludovici Dutens:' Geneva, 1768. This edition contains a great deal of matter, referring especially to law, natural science, ethnography, &c., and many letters which have not yet passed into the more recent but unfinished editions.

II. 'God. Guil. Leibnitii opera philosophica quæ

extant latina, gallica, germanica omnia,' ed. Joh. Ed. Erdmann: Berlin, 1840. This is the most handy edition; but as the correspondence is not complete, it is by no means sufficient for the historian, though it suffices for the purely philosophical student.

III. In the year 1843, G. H. Pertz began an edition of the works of Leibniz, under the title, 'Leibnizen's gesammelte Werke, aus den handschriften der Königlichen Bibliothek zu Hannover herausgegeben,' and edited himself the (then unpublished) 'Annales imperii occidentis Brunsvicenses,' in three volumes; and in a fourth volume, 'Geschichtliche Aufsätze und Gedichte' (1847). Unfortunately this edition did not aim at completeness; and in the preface to the fourth volume several historical writings of Leibniz are mentioned, notably his essays in the 'Scriptores rerum Brunsvicensium,' as not having been included. The second series of this edition, which should have contained the philosophical works, does not extend beyond one volume, which gives the correspondence of Leibniz with Antoine Arnaud. It was edited by Grotefend (Hanover, 1846). This volume can be dispensed with, as it is incorporated in the edition of Gerhardt mentioned below.

IV. The only complete edition—so far as I know—is that of Leibniz's mathematical works by Gerhardt, an indefatigable student and editor:—

'Leibnizens mathematische Schriften, herausgegeben von C. J. Gerhardt,' 7 vols.: London and Berlin, 1850; Halle, 1855-63. It appeared as the third series in the edition of Pertz.

V. 'Leibniz's Deutsche Schriften, herausgegeben von Dr G. E. Guhrauer,' 2 vols.: Berlin, 1838 and 1840.

VI. 'Œuvres de Leibniz, publiées pour la première fois d'après les manuscrits originaux avec notes et introductions,' par A. Foucher de Careil, 7 vols.: Paris, 1859-75. The first two volumes, which appeared in a second edition, contain the theological works; vols. iii. to vi. the political works; vol. vii., entitled 'L. et les Académies,' contains the whole of the writings bearing upon the foundation of Academies. I have found the two first and the last volume of much use in writing the fourth and sixth chapters of the first part of this essay.

VII. 'Die Werke von Leibniz,' von Onno Klopp. Of this magnificent edition only 10 vols. appeared (Hanover, 1864-77), belonging to the first series, and containing the historical and political works.

VIII. The most important edition is that of C. J. Gerhardt, 'Die philosophischen Schriften von G. W. Leibniz,' vols. i. and ii., and iv. and v.: Berlin, 1875-82. It contains valuable introductions, and gives the correspondence with eminent contemporaries. It is unfinished, and hence incomplete, like all the other editions of the philosophical works, but every student of Leibniz must eagerly look forward to its completion. The portrait reproduced here is taken from this edition, with the kind permission of the publishers, the Weidmannsche Buchhandlung in Berlin.

IX. The German translations of Leibniz's principal philosophical writings, by Schaarschmidt and von Kirchmann, in the 'Philosophische Bibliothek,' edited by the latter, can be recommended on account of the valuable notes and explanations attached to them.

CONTENTS.

PART I.

LEIBNIZ'S LIFE AND THE GENESIS OF HIS PHILOSOPHY.

CHAP.		PAGE
I.	LEIPZIG AND THE EDUCATION OF THE SCHOOLS,	1
II.	MAINZ AND THE EDUCATION OF THE WORLD,	20
III.	PARIS AND THE INVENTION OF THE DIFFERENTIAL CALCULUS,	41
IV.	HANOVER.—THE PHILOSOPHER AND ACADEMICIAN,	63
V.	CONTROVERSIES,	83
VI.	UNSUCCESSFUL ATTEMPTS AND NEW BEGINNINGS.—THE CHARACTER OF LEIBNIZ,	105

PART II.

THE PHILOSOPHY OF LEIBNIZ.

I.	THE PRINCIPLES OF LEIBNIZ'S PHILOSOPHY,	135
II.	THE SYSTEM OF LEIBNIZ'S PHILOSOPHY,	156
III.	THE SPIRIT AND CHARACTER OF LEIBNIZ'S PHILOSOPHY,	172
IV.	THE FATE OF LEIBNIZ'S PHILOSOPHY,	191

LEIBNIZ.

PART I.

LEIBNIZ'S LIFE AND THE GENESIS OF HIS PHILOSOPHY.

CHAPTER I.

LEIPZIG AND THE EDUCATION OF THE SCHOOLS.

A VARIETY of interests may lead us to inquire into the circumstances relating to the person and life of a thinker whose writings we wish to understand. But it is not often that this inquiry is facilitated by an equal amount of biographical detail, or rewarded by such a number of suggestive incidents, as is the case with Leibniz. Among the many questions we may feel inclined to ask, none is more important than that regarding the age at which he attained to that peculiar phase of thought which he represents in the history of culture. To this question Leibniz has himself given an answer. It was in his fortieth year that, according to his own testimony, he

felt himself satisfied, after having changed and rechanged his views during nearly twenty-five years previously. If we compare this with corresponding data from the lives of other great thinkers, we find that Descartes felt his doubts solved when he was about twenty-eight years of age. Spinoza appears to have arrived substantially at his peculiar doctrines at the age of thirty. In more modern times, Kant, when he was forty-five, seems to have reached those conclusions which he developed later on. Hegel had matured his views when he was forty; whereas Fichte at the age of thirty, and Schelling at twenty, had already marked out publicly the positions peculiar to them. Among the philosophers of this country, Locke had drawn up the outlines of his principal work before he was fifty; Hume had defined his sceptical view as early as twenty-five; but it took Berkeley many years to mature his ideas, which seem indeed to have been rounded off only when he was approaching sixty. These facts are not merely empty statistics; they suggest what importance we must specially attach to the work of each of these thinkers. The doubts of the youthful philosophical mind are expressed by Descartes and Hume; the first confident solutions by Fichte and Schelling; while the more serious student will turn to the patient inquiries of Locke and Kant, and will rest there with a consciousness of unsolved problems before him; or he will press onward to such solutions as human thought can afford, following in the track of Spinoza and Hegel, of Berkeley or of Leibniz, in the same degree as he may incline to logical strictness, to ideal purpose, or to fulness and breadth of thought as the supreme characteristics of human wisdom.

But second only to the interest which we take in the person and age of any author who has bequeathed to us a great work of thought, is that with which we turn to the age of the world and nation which produced both. If he is the labourer, the world at large, the nation in particular, is the field on which he has cast the seed. Has this field been a large or a small one? Has it been prepared by previous cultivation to receive the seed, which has sprung up readily and brought forth abundant fruit; or has it been unprepared, and unable to develop blossom and fruit, allowing much of the seed to lie dormant, or to grow slowly, awaiting the help of other elements to ripen it? And again, has the seed itself been the product of primitive growth, or has it been gathered from a plant pruned and ennobled by previous care and nursing? These questions, expressed in less figurative language, indicate the lines on which our exposition will proceed.

Few periods in the history of any civilised nation could have been less favourable for the pursuit of literary work than the middle of the seventeenth century in Germany, where Gottfried Wilhelm Leibniz was born, at Leipzig, on the 21st day of June 1646. His father, a jurist and professor of moral philosophy at the university, died in the year 1652, leaving his son under the care of a widow, only thirty-one years of age. She was the third wife of his father, a good Christian woman, who conscientiously devoted herself to the education of her only child. There were besides two older children, a son and a daughter, by the father's first wife. Guhrauer, the biographer of Leibniz, shows that for several generations back his ancestors on both sides

were well connected, and commanded the respect of their neighbours. Their means were considerable, and we are told that his mother was religiously bent upon preserving in the children the good name of their ancestors, *μηδὲ γένος πατέρων αἰσχυνέμεν.* Leibniz's father combined—as did his son afterwards on a larger scale—practical work and philosophical studies, being not only a professor but also a notary of considerable eminence; but the more important traits of the son's character seem to have come from his mother, of whom in an obituary notice it is said, that besides being to every one a model of piety, she overcame all personal difficulties with patience, trying to live with every one in peace and quietness. This conciliatory spirit showed itself in her son's celebrated attempts to bring about political and religious union on many occasions well known in history, and has found its classical expression in his philosophical system.

To be brought up in comparative affluence, surrounded by a scientific and studious atmosphere, and, more than all, to inhale from infancy the spirit of the true Christian *εἰρήνη*, must at all times be counted as an inestimable blessing. Viewed in the light of the history of those times, these circumstances seem to have exceptionally and providentially combined to bestow on the youthful mind of one of the greatest geniuses an education hardly otherwise attainable during the darkest period of Germany's history,—a period characterised by much want and poverty amongst the people, the uncouthness of even the higher and academic circles, and the rampant strife and discord of all religious parties.

Nothing indeed could be more desolate than the state in which Germany was left in the year 1648, when the

Westphalian peace brought the Thirty Years' War to an end.

The great changes which had revolutionised the world in the sixteenth century, and which in England had led to national greatness and independence, led in Germany on the contrary to national degradation and helplessness. More than a century had to pass before the nation began to utilise the achievements of the age of the Reformation and the discoveries of natural science. Leibniz was the first who turned the thoughts of his countrymen into channels out of which a culture peculiar to themselves was to spring. But to understand his work and position, it is necessary to go back to the beginning of the sixteenth century, and to analyse the conditions which from the same causes produced such opposite results.

Without entering into doubtful speculations as to the differences of national character, from which varying developments may have arisen in England, France, and Germany respectively, it is sufficient for our present purpose to point to the geographical differences in the situation of these three countries. Even in common life we are inclined to look upon an abundance of external means, a multitude of points of contact with the world, and a variety of interests, as dangerous advantages bestowed by nature or inheritance upon any individual. We only think of them as unmixed blessings if they fall to the lot of him in whom we can look for moral strength and for that self-control which is gained by habit and education. The narrow sphere, the straight road, the limitation of interests and progress, may, we think, guarantee a safer though a slower progress. The same reflections must apply in

some degree to the growth of national life. The indefiniteness of the natural boundaries of Germany, the vast extent of the country, the great variety of its climate, and its contact on every side with greatly differing nationalities, have at all times presented difficulties to a settled mode of government and to a national organisation. Such a situation is far less favourable than that of France, for which nature has defined two-thirds of its boundaries; or than that of Britain, for which she has defined the whole. And if this disadvantage has not even now—by means of a complicated machinery of culture — been thoroughly overcome, how much more must it have stood in the way of the development of the German people in the early middle ages, which we look upon as the period of the infancy and growth of modern European nations! Moreover, the central position on the map of Europe has always destined Germany to be the arena of all the great European conflicts, the meeting-ground for the northern and southern, as well as the western and eastern nations. Wars and battles, frequently fought for no national purpose, brought with them a want of rest and liberty, those first requisites of national progress, and left behind them poverty and lawlessness. But these geographical disadvantages, which under the most favourable conditions could only have been counterbalanced by an unusual amount of statesmanlike sagacity and moderation, not to be met with in those dark ages, were increased by still greater political disadvantages, which till now have been far too little recognised.

The civilisation of the Christian world is an in-

heritance from the ancient; its history forms a continuity with that of the Roman Empire. The bearers of the new civilisation were the Teutonic race; the transmitter of the ancient civilisation was Rome. The Roman Church, the only great and universal power,—which, whilst the Empire had lost its extent and its temporal sway, still upheld the uniting bond through the new faith,—preserved the continuity of history, and aimed at the reinstitution of that temporal power which had been lost. The Teutons being the conquerors of the world and the race of the future, it was natural that the Popes in Rome should confer upon them the honour and burden of re-establishing the Roman Empire. And among the different Teutonic nations it fell naturally upon that which had most tenaciously preserved its independence in the great conflicts, and which, whilst other nations had been either overrun or scattered in aimless wanderings, maintained its original country. These were the Germans proper or Franks, in contradistinction to the Gauls, who had been completely conquered by the Romans, and to the wandering nations, the Goths and Vandals, who had become mixed up with the peoples of southern Europe. From the Franks sprang the first great political conqueror and governor of the new world, Charles the Great. On him Pope Leo III. conferred, on Christmas-day of the year 800, the title of Roman Emperor. Charles was essentially German, his capital was Aix-la-Chapelle. The Roman crown was henceforward considered an honour belonging by precedent to the Franks or Germans. After having been lost by the division of the empire, it was again claimed

by Otto the First, who was the founder of the Holy Roman Empire, "denoting the sovereignty of Germany and Italy vested in a Germanic prince."[1]

It may well be conceived what calamities and sacrifices to the German nation were involved in the apparent glory and honour of this union of the two crowns. In looking back from our point of view, we are forced to attribute the progress of civilisation to the modern principle of national development. Through it separate languages only became possible as well as popular literature, the diffusion of knowledge, liberal government, and the education of the multitude. The recent theory of division of labour found its practical application on the grandest scale, when, in the course of the middle ages, western Europe was divided into a number of independent and independently governed nations. Compared with this, the principles which dictated the government of the German Empire were antiquated and unpractical; antiquated, because they attempted to revive and continue that form of united government under which the old world had succumbed; unpractical, because they tried to connect the Christian religion with a temporal instead of a spiritual kingdom. Nor would it be correct to attribute the comparative freedom with which France and England were permitted to look after their national consolidation and home government to a conscious recognition of the truer principle. Their blessings were thrust upon them. Removed from the theatre of the world's history and the centre of civilisation, England was by nature and circumstances forced into the

[1] See for a lucid and interesting description of this whole subject, Bryce, 'The Holy Roman Empire.'

course her history has taken; whilst France, unwillingly cast into the background by a stronger Germany, was retarded in her historical progress just in the same degree as her rulers from time to time fancied they saw an opportunity for gaining the lost ascendancy, in imitating the old imperial policy, or in attempting, as Napoleon the First did, to revive the obsolete idea of a world-empire.

The immediate consequences to Germany of this world-policy were clear. The very circumstances which for a home-ruler would have been the cause for establishing a strong and central government—viz., the dangers threatening on all sides from barbarous peoples, led in Germany to a division of the empire into a number of smaller states, each with a prince strong enough indeed to defend himself, and a necessary help to the imperial force which was frequently fighting in foreign countries for foreign interests, but at the same time a dangerous foe if inclined or if roused to oppose the central authority. Forced by their Italian policy to confine themselves principally to their western and southern dominions, the German emperors failed to assimilate and combine the northern and southern interests and tastes within the realm itself, and laid the foundation for those conflicts which, even after the empire ceased to exist, remained the continual cause of disunion and internal disaffection. But what we have principally in view is the peculiar national importance of those two great events which heralded modern times: the discoveries of science and the Reformation. Germany as a nation was not prepared to utilise either of these to full advantage.

In spite of the absence of settled government, the later middle ages had witnessed in southern and western Germany a considerable development of municipal life and wealth. The connection between Italy and Germany went hand in hand with the trade of the world, and the Crusades opened out connections with the East, whence most of the luxuries of that age came. The emperors also, being always in need of money, nursed and protected the industries of the towns, and granted them many liberties. Thus, in the large towns of southern and western Germany, arts, manufactures, literature and culture, existed much earlier than in the other countries of western Europe. The Hanseatic League along the north coast of Germany and Holland commanded the trade of the north, and formed the channel through which commerce and industry were introduced into the northern countries and into England. But the invention of the compass, and the discovery of America and of the sea-way to India, completely altered the course of European trade. The maritime nations became the carriers of the world, and the open sea a safer road than the dangerous and tedious overland route, or than the coasting line along the shore of the Mediterranean, each of which was equally threatened by Mohammedan robbers and pirates. This change was a great blow to the trading towns of Germany and to the Hanseatic League. They never recovered from it. Simultaneously with this great material revolution, and indeed partly caused by it, came the great spiritual revolution, known as the Reformation of the Church. The government of Rome had become intolerable, the yoke of sacerdotal tyranny had to be

broken. But it was only in England that this rupture was utilised in a political spirit; in Germany the early reformers limited themselves to a religious view of the question. The emperor naturally regarded the movement as antagonistic to the interests of the holy crown, which was his chief glory; and among the smaller princes, some of which supported the Reformation vigorously, none was strong enough or willing to undertake the contest in a national spirit. Frederick the Wise of Saxony refused the German crown in the year 1519, when it was offered to him on the death of Maximilian I., and by doing so doomed Germany to an age of internal strife and warfare, which in course of 130 years destroyed all her material wealth, dismembered the empire, depopulated the country, brutalised the people, and only ended through the absolute exhaustion of the nation. The Westphalian peace was concluded in the year 1648 from sheer necessity, just two years after the birth of Leibniz. Germany's first philosopher came to her rescue when she was most in want of a reviving influence. Few elements of higher value had survived the destructive process of continued war and discord, and few opportunities existed for the development of a genius like that of Leibniz. Yet through a combination of happy circumstances, he was brought into early contact with the best of the culture that was left, and thrown probably into the only course where his talents could be utilised. The theological warfare of the Churches and their representatives was, though the most prominent, still happily not the only outcome of Luther's and Melanchthon's work. But during the time of the Reformation, and

after it, there was a class of men who were repelled by the noisy strife of the new Church as much as they were by the hollowness of the old. Clinging to the deeper religious truth of the Reformation, which placed the value of faith in its internal and spiritual manifestations, they nursed within themselves a true Christianity. In literature this phase of the religious life found many classical representatives, before, during, and after the Reformation, from Thomas a Kempis (died 1471) through Tauler (1521) and the author of the 'Deutsche Theologie,' many of the writings (especially the hymns) of Luther, and J. Arndt's 'True Christianity' (1605), down to Paul Gerhardt's hymns (published 1658-1667). This inner Christianity in some instances lost itself in mysticism, as in Jacob Boehm (1575-1624); in others it developed into pietism, as in Spener (1705); but in its true form it exhibits the best side of the religious life and work of Germany. To its teaching we must trace the religious influences under which, through his excellent mother, Leibniz was brought. As she lived in a university town, and as her own and her husband's connections moved in an academic circle, the young Leibniz was not obliged to leave his home or to become acquainted with the doubtful liberties, the numerous temptations, the barbarous follies of student life. In the circle of his older friends the liberal advice of one member prevailed over the prejudices of others,—who, according to the pedantic fashion of the age, used to limit the boy to catechism and picture-books,—and the library of his father, previously kept under lock and key, was opened to him before he was ten years old. Here, ac-

cording to his own testimony, he used to bury himself in the society of Cicero and Quinctilian, Seneca and Pliny, Herodotus and Xenophon, Plato, the Roman historians, and the Greek and Latin fathers. In a philosophical essay written in later life, under the name of Gulielmus Pacidius, he says of himself, that left to his natural thirst for knowledge, he seemed as it were to be guided by the "Tolle lege" of a higher voice, which led him to study and imbibe the spirit of the ancients, with whom he became sufficiently familiar to acquire the form of expression and the tenor of thought peculiar to them. They led him to aim at two things, both foreign as it seemed to the writers of the day—viz., in words to attain clearness, and in matter usefulness. Thus early he established for himself the formal rule of definiteness and transparency of diction, and the practical one of doing and saying everything for a purpose and an end. The first led him to the study of logic, and to a variety of pursuits which engaged him during the whole of his life, all of them tending to make his knowledge more correct, more ready, and more complete, by classifying and systematising it, by using signs and characters in place of words, by generalising terms, and by bringing every inquiry under a principle and method. The natural field for such a talent as his was mathematics and their applications. But this formal and methodical turn of his mind was tempered by the desire to see the purpose and meaning and the practical outcome of everything. This led him to appreciate the work of Lord Bacon, and governed the various attempts of his later life to introduce philosophical reasoning into questions of law, of administration, and of political and religious

government. The same tendency, joined to his early love of completeness and comprehensiveness, naturally led Leibniz to a philosophical inquiry into the meaning of reality, and of the true essence of things and their connection with each other. Thus, while in the former we see what guided Leibniz to his great mathematical invention—viz., the differential and integral calculus,—by which he reduced to a principle and general method the scattered solutions by eminent mathematicians of problems all involving infinitely small quantities,—we see in the latter the germ of his not less celebrated doctrine of monads, and of the pre-established harmony of all things.

No school existed at that time in which a genius with such remarkable talents could be trained; he was left to the guidance of his own taste,—he was self-taught. He says significantly in later life: "More frequently will he who does not understand an art find something new than he who does,—he who is self-taught sooner than those who are not,—for he enters by a road and gate unknown to others, and gains a different view of things. He admires that which is new, while others pass it by as something well known."

In his fifteenth year, 1661, Leibniz became a student at the university of his native town, Leipzig; but the instruction afforded him there was inadequate. Under Jacob Thomasius, the father of the celebrated Christian Thomasius, he studied philosophy, ancient and scholastic; but it was through his private study that he became at the same time acquainted with the philosophy of Descartes. After two years, when hardly seventeen, we find him defending his first dissertation, "De prin-

cipio individui," on the principle of individuation. This is the celebrated problem of the schoolmen. Do individual things exist, or only their attributes or qualities? Leibniz adopted the former alternative. Existence, according to him, belongs only to individuals; general terms exist only in our thoughts; whatever exists is by its very existence individual. But in one of his corollaries he adds, that the essence of things is not eternal, except they are in God. In these theses we can see the beginning of his later philosophical doctrines.

This dissertation, which, like all academic dissertations, was intended to be a "specimen eruditionis" as much as an expression of philosophical opinion, bears testimony to the young author's extensive knowledge of scholastic learning as well as to his dexterity in handling their dialectical methods. The position he took up had been gained after much thought and hesitation. He said himself in later life, that he remembered having at the age of fifteen, during a ramble in the "Rosenthal,"—a well-known place of resort near Leipzig,—decided to give up the belief of the schoolmen in the substantiality of forms, and to adopt the mechanical view of nature, which led him to the study of mathematics.

It was, however, only later in life that he began a profound study of the higher mathematics. At Leipzig he followed the course prescribed to him by his prudent advisers, and devoted himself to the study of law, with the hope of gaining in this way—as many of his forefathers had done—a practical and remunerative occupation. And indeed the choice was not unwise. The study of law had for many centuries past been pursued

in Germany with much interest. The empire of the world had descended from the Roman emperors through the Church to the German emperors, and these had early shown a particular interest in the *lex regia*, as it was laid down and embodied in the great collection of Justinian. The Roman law—the law of the emperors—was studied with zest, to the comparative neglect of the native law; because the former exalted the prerogative and sanctioned the idea of the submission of the people. But besides, a new interest had recently sprung up in legal studies. For in the year 1625 Hugo Grotius had published at Frankfort his celebrated treatise 'De jure belli et pacis.' This work, which attempts to demonstrate the principle of right and the basis of society and government outside of the Church, had been originally suggested by the legal practice of the author, who in his youth had been employed by the Dutch East India Company to decide a question of commercial importance. This had led him to inquire into the lawfulness of war in general, and into the principles of right and of society. This book created a profound impression, and became a new departure in legal science, differing essentially from the doctrines of Roman law as they had been expounded in the interest of the Church and the empire. Not far from Leipzig, at the University of Jena, Professor Erhard Weigel, a mathematician and philosopher, was at this time lecturing on what was termed natural law. Leibniz went in the year 1663 for one session to Jena, and was much influenced by the lectures and by the personal intercourse with Weigel. He was told there that Samuel Puffendorff, who published in 1660 his work, 'Elementorum juris-

prudentiæ universalis libri duo,' which had made much sensation, and had induced the Elector Charles Ludwig to found at Heidelberg a chair for "Natural and International Law"—had got his new ideas mainly from Weigel. It was also of significance for Leibniz that Weigel was both mathematician and philosopher, a combination which eminently suited the mind of the former, whose literary productions during that time give sufficient testimony that he was largely influenced by Weigel. In the year 1664 Leibniz gained the degree of "Magister Philosophiæ," by a dissertation entitled "Specimen difficultatis in jure"; and in 1665 he wrote and defended another entitled "Specimen certitudinis in jure,"—both of which he published in a somewhat modified form in 1672, under the title 'Specimina juris.' Two important positions are vindicated in these early attempts: firstly, the necessity of introducing philosophical principles and reasoning into matters of law; and secondly, that the ancient jurists had brought so much thought and knowledge to bear upon their subject, that the principal task which they left to their successors was the systematic arrangement of the matter which they had collected. Thus he indicated the two great objects of the modern science of law: the first a philosophical inquiry into the principles of right, the second a systematic arrangement of the matter handed down to us. At the same time he was composing his treatise "De arte combinatoria," in which we see the germs of ideas and theories developed by him in much later years. The mathematical rules, by which the combinations of a number of elements can be found, seemed to Leibniz to be suggestive of similar processes in other sciences.

Aiming at the advancement of research by making science and language more definite, he saw the model for all reasoning processes in the methods of algebra, where signs take the place of words, and remove their ambiguity. If we could reduce all the notions with which the abstract sciences operate to simple ideas, we might calculate their possible combinations and express these combinations by the use of general characters, and thus attain the strictness and completeness of mathematical reasoning. These pursuits occupied Leibniz during the whole of his life ; and in a fragment of later years he comments upon the dissertation "De arte combinatoria," without regretting its publication, which proves how early and independently he had laboured in that field, although he regrets the want of such higher mathematical training "as had fallen to the lot of Pascal under the tuition of the great Parisian mathematicians."

In spite of the great admiration of many among his professors and friends, which these early signs of erudition and original research commanded, the way to the highest academical honours was not made easy to Leibniz. Pedantry and jealousy were exhibited on various occasions ; and these, together with other reasons, among which we must mention the death of his mother in 1664, and a burning eagerness to see more of foreign countries and to acquire a knowledge of higher mathematics, induced Leibniz to quit his native place—never to return except in passing—in order to visit the University of Altdorf, then belonging to the free town of Nürnberg. At Altdorf he obtained the degree of "Doctor Juris" by a disputation and a dissertation "De casibus perplexis" (published later on in the 'Specimina juris').

In this dissertation he maintains that the law of nature, the principles of which are to be philosophically established, must be resorted to in any case in which the positive or historical law affords no means of deciding.

The impression which Leibniz made at Altdorf was so favourable that a professorship was offered him, but he tells us that his desires drew him in quite a different direction. He declined, probably because he felt convinced that for the success of his scientific and practical endeavours, for the carrying out of his reformatory plans, the life of a small university town offered neither the necessary assistance nor the proper sphere of action. Two regions were as yet unknown to him,—viz., that of practical life, with its interests and problems; and that of modern science, which had begun to be cultivated in Holland, in Paris, and in London. It is important to remark here, that among the other results disastrous to Germany, the wars of the Reformation and of the seventeenth century had driven out of that country the study of the mathematical sciences, which, two hundred years before, had received earlier attention there than in other countries, from Copernicus, Kepler, and Tycho Brahe. The development and continuation of the labours of these pioneers of modern science was left by their native country to the great Italian, English, Dutch, and French philosophers, whose work was, even at the time of Leibniz, only imperfectly known in Germany. To become acquainted with the new science, Leibniz had to wait till fortunate circumstances led him abroad, whence he was to bring back and reimport into his native country the studies to which Germany had given the first impetus.

CHAPTER II.

MAINZ AND THE EDUCATION OF THE WORLD.

Leibniz combined in his twentieth year a knowledge of the classical authors and of the aims and methods of scholastic learning, with an appreciation of the new philosophy of Bacon and Descartes. With a love of formal correctness and perspicuity, he united that characteristic of practical wisdom, which thinks and acts for an end and for a purpose. With an admiration for the strictness of mathematical reasoning, and a desire to learn more about higher mathematics, there went hand in hand a good legal training, which not only distinguished between but tried to join philosophical (or natural) and positive (or historical) law. Religious faith and reverence for the Creator and His work existed in his soul, side by side with a mechanical view of nature and her ways. And lastly, all these talents, all this knowledge, all these acquisitions, which induced his friends to look upon him as a prodigy—*pro monstro erat*—were mingled with a deep yearning after a something larger and wider, a consciousness of the defects of his culture, and a desire to do something greater and more useful. How different does Leib-

niz appear to us—even so early—from the other great fathers of modern thought,—from Lord Bacon, Descartes, and Spinoza! In common with the first he had a love of practical pursuits and moral purposes, and the intention of making learning more useful. With Descartes he shared a love of mathematical methods which was foreign to Bacon. He was distinguished from both of them, however, by his admiration of Aristotle and the ancients, and by his appreciation of the schoolmen. These both Bacon and Descartes despised, knowing them probably only through the instructions of their school-days, instead of through an actual perusal of their works in the recesses of a private library, by which Leibniz knew them. At the age of twenty Leibniz appears to have been more settled in his ways of thought than Descartes, who passed through a stage of doubt unknown to Leibniz; but at the same time, he was less ambitious than Bacon, who so early looked upon himself as a reformer of philosophy. There were few points of resemblance between Leibniz and Spinoza, of whom at the age of twenty we know little, and who at the age of twenty-four was expelled from the Jewish synagogue to which he belonged on account of his opinions. The obscurity in which he lived, and the special line of his studies, form the great contrast between him and Leibniz.

So early, then, as his twentieth year, we are led to recognise in Leibniz's life and training peculiarities which are of importance to his philosophy. Few men began to build so early, few laid so broad a foundation; no mistakes were made in construction, no doubts had to be overcome, no time was lost in aimless search.

Every step he took was onward, every experience increased the means he already possessed, every stone which the builder took up was placed in the right position. No conclusions were arrived at hastily, no part of the edifice was finished prematurely; in harmony with itself, and without loss of evenness and balance, the work progressed steadily, a true example for the historical student of that process which Leibniz himself afterwards conceived to be the explanation of the world —viz., the individuality of everything real and the harmony of all things.

Leaving the academic circle and the town of Altdorf, Leibniz had not far to go to find a new and interesting sphere of life. His steps were naturally directed to Nürnberg, a free imperial town, the capital of a small republic, under the supremacy of the emperor, comprising seven towns and many castles and villages. Except Augsburg, Nürnberg was almost the only example of a rich community surviving the horrors of the Thirty Years' War without a complete loss of industry and prosperity. In the rest of Germany the prolonged war had made the smaller courts, which strove for supremacy, progressively important. These, forming a kind of opposition to the emperor, tried to mark their position by an unworthy imitation of the elegance and dissipation of the French Court; and by so doing, they drew upon the resources of the country almost as much as the imperial and foreign armies had done, and largely contributed to the general impoverishment and degradation. Besides this, they fostered a taste for French manners, customs, and fashions, detrimental to German interests. The remnants of native industry and of national

life were to be found only in exceptional places. Among these Nürnberg was conspicuous; and it was well for Leibniz, who at this time began to take an interest in political matters, that he should become personally acquainted with what little was left of truly German spirit and home culture. His appreciation of this was testified to by himself in a political pamphlet, written a few years later, when he had become acquainted with the unpatriotic spirit existing in other German circles, for he singles out Nürnberg as one of the few rare instances of surviving national interests and habits. It was significant that one with the culture of Leibniz should do this, since he must have been, for very different reasons, attracted by the language and literature of France, which contained the standard works of the new philosophy, and many mathematical and physical writings of great importance. Leibniz's residence in Nürnberg was not of long duration; but in the course of the year which he spent there he became a member of that remarkable society which, under the name of "Gesellschaft der Rosenkreuzer" (fraternitas roseæ crucis), had a branch in Nürnberg. It was a society of alchemists, counting among its members many clergymen and doctors, founded in the year 1654 as a branch of that extraordinary fraternity which, realising the satire of Johann Valentin Andreä, entitled the 'Chemical Nuptials of Christian Rosenkreuz,' had, in the beginning of the seventeenth century, combined alchemists of all nations into a united body. The supposed secrets of the philosopher's stone, the alkahest, and the elixir of life, previously known only to individuals, became more accessible through this society.

They were thus laid open to criticism and science, which ultimately exploded them. Leibniz, anxious to learn wherever he could, introduced himself to the president of the society by an essay, artfully prepared by means of obscure technical terms collected from books on alchemy. This essay produced such an effect, that he, whose name was already known, was at once received by the society, and nominated secretary. In this capacity he had to register the chemical experiments made by the members, and to conduct the foreign correspondence. This, besides teaching him the follies and superstitions of this fictitious but fashionable wisdom—which he did not fail to expose in after-life for the warning and benefit of others—made him acquainted with the elements of chemistry. It had for him a greater value still; it led him into the society of rich and influential persons, and was the means of his being introduced, in 1667, to the Baron Johann Christian von Boineburg, an acquaintanceship which ultimately decided his career.

The name of Boineburg takes us into quite a different province of German life and history from that with which we have hitherto dealt, and as it is outside the interests and the knowledge of English historians, a few words referring to it may not be out of place. For reasons already explained, the history of the German people long before the age of Leibniz was not identical with the history of the empire. Many parts of the empire had for centuries commanded an independence much greater than, in fact, the acknowledged sovereignty which their rulers enjoy at the present day. This independence, however, not being clearly defined, rested largely upon such fortuitous circumstances as the natural

position of the country, its neighbours, and, more than anything else, the personal importance and prudence of its rulers. These rulers rarely possessed a military force strong enough to maintain itself if matched against the armies of their neighbours. Their resources lay therefore more in establishing judicious alliances, in cultivating personal relations, and in commanding private influence with those on whom for the moment the fate of the world principally depended. The residences or courts of these smaller princes were thus the homes of secret diplomacy, an art in which many of them were adepts, through which they became frequently the media of great international negotiations, which decided — for good or bad—the fortunes of nations; and by which the local history of towns and provinces as little destined by nature to play a prominent part in the world's history as any of the provinces of France or the shires of England was sometimes raised into prominence. The more influential rulers surrounded themselves with elegant, polite, and intelligent society, and by counteracting the centralisation, so inevitable in France and England, they caused that widespread diffusion of the means of knowledge—institutions for education, collections and academies of all kinds, theatres and orchestras — for which Germany has become celebrated. But there was another reason why an introduction into such circles was particularly important for a man of Leibniz's training. The diplomatic work of these smaller courts required the support of legal science and historical erudition as much as the personal influence and connections of the princes. Alliances had to be made, and their advantages set forth by referring to the principles of

international law and the facts of history; wars had to be entered into for purposes of supposed social or commercial advantage; articles of peace and treaties had to be drawn up; boundaries had to be fixed and powers conveyed. Last, and not least, these local rulers and half-independent princes strove to emancipate themselves more thoroughly; and inasmuch as some of their number enjoyed greater rights of precedence and representation than others, it was a matter of continuous jealousy and ambition to establish reasons for advancement and to bring about the recognition of their dynastic claims by the emperor. In these frequently futile and ridiculous aspirations much time and power were lost; false arguments and sophistry were resorted to, and over the claims of the princes the interests of the people were mostly forgotten. There were, however, exceptions, where the cause was a right one, and the policy enlightened and disinterested. It is clear that in such cases learning and ingenuity could be put to good account, and that many opportunities were offered for useful research and for the establishment of right principles of government. The post of legal councillor or historian at the court of an enlightened and influential ruler must indeed have afforded to an observing mind means for learning the ways of the world and the factors of historical and social progress, more than probably any other station in high or middle life.

None of the estates of the empire was more powerful and important than that of the spiritual Elector and Archbishop of Mainz, the arch-chancellor and director of the empire. He was in the empire what the Pope was in Europe; he was the highest Church dignitary, and

the first of the electors. A historian says of these bishops of Mainz: "Hatto and Willigis governed the empire; Gerhard boasted of having the emperors under his thumb; Diether, long before the Reformers, curtailed the pretensions of the Papal chair; Berthold was the first advocate of general peace and of the imperial courts of justice; Johann Philipp the maintainer of the balance of the empire and of the peace of Europe." This last-named, Johann Philipp von Schönborn, one of the most eminent men of his age, had been called from the bishopric of Würzburg to the primacy of the empire and archbishopric of Mainz in the year 1647, when the negotiations for the peace of Münster were in full train. In consequence of the difficulties which presented themselves, a man was wanted who enjoyed the esteem of every party, and who had the name of a lover of peace and of being the friend of his country. This eminent dignitary had recognised the talents of Johann Christian von Boineburg, one of the most celebrated diplomatists of his age, who was born at Erfurt in 1622, and had received a legal education under the celebrated Professor Conring of Helmstädt. He had lived at the Court of Christina Queen of Sweden, and in the company of her great chancellor Axel Oxenstierna, and had become noted by his able decision in many of the disputes between the different German princes. Schönborn called Boineburg to his service in 1652. Situated as these great diplomatists were, so to say, between the foreign ambitions of France and the selfish policy of the house of Hapsburg, they clearly recognised the twofold danger which undermined Germany's national welfare; and they strove, with all the power of their position

and all their ability, to solve the great political problems of the day. Among these none was more difficult than the question of the succession on the death of the Emperor Ferdinand III. in 1657. They succeeded in settling it in favour of Leopold, King of Hungary and Bohemia, and thus prevented the outbreak of a new war, which the pretensions of Philip IV. of Spain and of Louis XIV. of France might have brought on.

It would not be correct to treat as merely accidental the fact that Leibniz had the good fortune to be introduced into these circles by the most eminent statesman of one of the most enlightened courts of Germany—by Boineburg. It is impossible to imagine that one who had embraced so early the principles of right conduct of life and thought—viz., transparency and usefulness—should have become the instrument of the narrow intrigues of a small and selfish prince. We must assume that, with the clearness of vision peculiar to him, Leibniz saw at once the higher importance of this new connection; and that he exchanged Nürnberg for Frankfurt, where Boineburg lived, with a distinct feeling that he was furthering the great aims which he had set out for himself. Nor does it appear that he hastily entered into any service, as he lived for some time merely as a private gentleman and as the friend of Boineburg in Frankfurt.[1] Through him Leibniz was encouraged in

[1] Boineburg himself had retired into private life, and was occupied with studies for a large work of a literary and historical character—which, however, never appeared. He had an excellent library, which Leibniz catalogued. He was a Roman Catholic (by conversion), and, like many other eminent men of that day, took great interest in the projects for the reconciliation and public tolerance of the different Churches, none of which, in the Thirty Years' War, had been able to attain a complete victory or supremacy over the others.

a variety of studies—all with a practical tendency—of which we can only mention a few. Boineburg was desirous of introducing Leibniz to the Elector of Mainz, a man of enlightened mind, who protected science and literature, who exercised a great political influence, and who, among other things, had appointed one of the professional men attached to his Government—Dr Lasser—to remodel the body of Roman law so as to meet the wants of German jurisdiction. Such attempts to codify, amplify, and reform the existing law, which was made up of foreign and native elements, were common at that time. Louis XIV. of France had instituted a new arrangement of civil law under the title of "Ordonnance civile." Leibniz himself, on the journey from Nürnberg to Frankfurt, had put on paper some ideas regarding legal instruction, which Boineburg induced Leibniz to print anonymously, and to dedicate them to the Bishop of Mainz, in the year 1668, with the title, "Methodus nova discendæ docendæque jurisprudentiæ." This essay, although somewhat ambitious and deficient in practical moderation, was nevertheless widely read, and, like many other writings of Leibniz, has been in modern times repeatedly quoted, and even translated into French. For Leibniz this publication had the advantage of introducing him to the great prince-bishop, who requested him to assist Dr Lasser in the work he had been intrusted with, and promised him a weekly honorarium—which, however, owing to the disturbed state of revenue and property, was frequently not forthcoming. Leibniz soon after published with Lasser a sort of prospectus of their undertaking, with the title, "Ratio corporis juris reconcinnandi." He tried to carry

out here what in his early essay—"De arte combinatoria"—had been foreshadowed,—*i. e.*, he tried to construct a table or map containing all the concise and clear principles of law, by the combination of which, as it were mechanically, complicated cases could at once find their solution.

A tract of an essentially diplomatic character, composed for the Baron Boineburg during the winter of 1668, was the means of introducing Leibniz into a new province of literature. Boineburg, relieved from the service of any special ruler, was frequently appealed to as arbiter in questions of political importance. Such a case was submitted to him in the autumn of 1668. The king, John Casimir of Poland, too impotent to maintain the integrity of his kingdom or to bear the burden of government, had voluntarily abdicated. For the purpose of electing a successor, a diet of the states of the kingdom had been called for the spring of 1669. Among the many pretenders, the great elector Frederick William of Brandenburg favoured the Catholic Count Palatine, Philipp Wilhelm von Neuburg, and had recommended him to intrust Boineburg with a mission on his behalf to the Polish diet. This mission was to be anticipated by a tract, published anonymously under the title, 'Specimen demonstrationum politicarum pro Rege Polonorum eligendo.' Leibniz, the author of the tract, appears in the guise of a Polish nobleman. The expected end was not gained; but Leibniz had taken the opportunity to show how the form of mathematical reasoning —hitherto applied only in philosophy and law—might be used in political and diplomatic discussion, and in this respect he valued this juvenile effort even in his later years.

Of yet greater importance to his own philosophical development were a series of letters and essays written by Leibniz at Boineburg's suggestion, referring to the religious and metaphysical controversies of the age. Boineburg himself had in a spirit of moderation taken up these controversies, and was seriously employed in trying to find some ground common to Catholics and Protestants, and a way towards union and mutual tolerance. Leibniz retained throughout his life a deep and active interest in these irenical efforts, of which we shall have to speak later on. At the time of which we are now speaking, his studies were principally devoted to a refutation of the irreligious and atheistical ideas which the Socinians, headed by Wissowatius, were spreading. There is, however, little of theological controversy in these writings. That which interested Leibniz most, was the difference between ancient and modern philosophy. Whilst advocating in general a mechanical view of nature,—as Bacon, Descartes, Gassendi, and others had done,—he maintains that there cannot be an ultimate explanation without an immaterial principle, which—to explain the harmony of everything — must be one and universal; and he agrees with Aristotle and not with the moderns, maintaining that the opinions of the former were more correct, and that he could not class himself with the Cartesians. It has nevertheless been shown that his writings at this period bear strong evidence of his intimate acquaintance with Descartes' works. About the same time Leibniz brought out a new edition of a work published more than a century before (1553) at Parma — by Marius Nizolius, one of the many eminent Italian philologists who did so much for the revival of classical studies

—especially for the study of pure Ciceronian Latin, in opposition to the barbarous Latin of the schoolmen. The work was entitled 'Antibarbarus, seu de veris principiis et vera ratione philosophandi contra Pseudophilosophos.' At the request of Boineburg, Leibniz re-edited this work, and wrote a dissertation on the philosophical style of Nizolius marked by much learning. The essay is important, as showing how intimately acquainted Leibniz must have been with a department of literature which we have not as yet had any occasion to refer to, but which has had a greater influence on modern Continental philosophy than has sometimes been recognised — viz., the literature of the Italian Renaissance. This dissertation also gives a good example of how Leibniz adorned every subject which he approached with the original ideas of his mind, and how every subject in its turn was made to yield up its share towards the enrichment of his mind, becoming a tributary to the great current of thought which emanated from him, and which grew wider and deeper as the years rolled on. It has been correctly stated that Nizolius's book would probably have been forgotten but for the preface of Leibniz, in which the latter discussed many questions of importance. Indeed, his remarks on the requisites of a good philosophical style, on the use of popular words, on the danger of technical terms, on the prevalence of scholastic philosophy in Germany as compared with England and France,—owing to the early introduction in these countries of the vernacular as the language of literature,—on the intrinsic aptness of the German language for philosophical expression, and many other points, will be read with interest now. This essay also

shows how Leibniz's admiration for an author goes hand in hand with a clear knowledge of his defects. Against Nizolius, he contends for an appreciation of Aristotle, and blames the modern philosophers for being more anxious to expound their own ideas than to bring out what was great and true in Aristotle and the schoolmen. He maintains that much of what is thought to be new could be found in the older writers; and that Descartes himself was staggered when many ideas, which he thought new, were traced to Aristotle and Plato, both of whom he despised. To English readers, who are accustomed to look back to the sixteenth and seventeenth centuries as the age which produced the models of English verse and prose—Shakespeare, Milton, and Bacon—the opinions expressed by Leibniz regarding the use of the vernacular may appear natural, and not unexpected. It is to be observed, however, that in Germany he appears in this respect as an innovator, and it is interesting for the biographer to trace his ideas to their origin. Leibniz's education was not a purely theoretical one. His father, and some of his relatives, had been professional lawyers. He himself tells us that, having early mastered the theory, he betook himself to the practice of law; and Boineburg has testified to his business ability. Now in his professional work he tells us that when in Leipzig he learnt to write German well; and in one of his tracts bearing on the question of the Reform of Law, he recommends that young jurists should be trained to speak in German. And as a model of German style, he singles out the legal opinions issued by the faculty and courts of law of Leipzig, in the electorate

of Saxony. This latter country possessed, as far back as the age of the Reformation, a constitution both lay and clerical, and an administration of justice independent of the empire. Luther, a century before Leibniz—himself a Saxon, and the first great master of the German language—recommended the style of the Saxon Chancellary. We must not, therefore, consider it as unimportant that Leibniz was born and trained in Leipzig, and that he there worked not only at the university but also in the law courts. It made him acquainted from the first with the German language in its best form, and led him to urge upon others the use of the vernacular; whilst his contemporaries were still using Latin exclusively, — whilst, for instance, Professor Conring was deploring the use of the French tongue by French savants; and whilst Thomasius, twenty years later, was prosecuted for attempting for the first time to deliver academical lectures in the mother tongue.

But Leibniz did not confine himself to merely recommending the use of the German language—he wrote at that time several long essays in German; and as they dealt with subjects which occupied him throughout his long and busy life and professional duties, we must here refer to them at some length. They were of a political nature, and stand in immediate connection with the events of the day, as well as with the journey to Paris which he undertook two years later—a journey which was to mark a new era in his mental development.

The political situation of Europe in the year 1670 was the cause of great alarm to every German statesman, —to none more than to the Elector of Mainz, and his friends Boineburg and Leibniz. The peace of Europe

seemed externally secured by the so-called Triple Alliance, which the English ministry had, much to the discomfiture of Louis XIV., brought about two years previously, in the beginning of 1668, between the three Protestant Powers, Holland, England, and Sweden. This unexpected and highly popular union had forced Louis to conclude the peace of Aix-la-Chapelle just at the moment when he had three armies ready to march simultaneously on Spain, Germany, and the Netherlands. The authors of this scheme intended this alliance to be the nucleus of a much greater and more powerful union, which should embrace other Powers, essentially the States of the empire and Austria, and which should form a guarantee for peace and a bulwark against the ambition of the French king. In this sense the extension of the alliance was much discussed throughout the empire, and many favoured it as the only means of maintaining the *status quo* and the *securitas publica*. The right conferred upon the single German states by the Peace of Westphalia, of entering into independent alliances for their own welfare and protection, had much increased the diplomatic importance of these centres, and had greatly contributed to the dismemberment of the empire. Several of the German sovereigns had been approached—especially the Elector of Brandenburg—as to their friendly feeling towards the alliance; and to none was this question of more importance than to the Elector-Bishop of Mainz, not only on account of the situation of his dominions, but also from his character as primate and director of the empire. Forced, as he was, to protect his own interests by private connections, and unable to count on the support

of the imperial forces, which were both distant and inadequate, he had already, in the year 1663, entered into a defensive alliance with his neighbours the Elector of Treves and the Duke of Lorraine. The Elector of Mainz was, however, too far-seeing and too patriotic not to recognise both the inadequacy and the danger of special treaties; and it was no doubt in his interest and in his spirit that Boineburg and Leibniz, during a sojourn at the watering-place Schwalbach in Nassau, in the summer of 1670, put in writing a series of considerations how the *securitas publica, interna* and *externa*, and the *status præsens* of the realm, might be put on the right footing. This tract was composed by Leibniz in three days, and written in the German language with the evident intention that it should be laid before the Diet at Ratisbon, where the discussions were carried on in the mother-tongue. In these patriotic pages the root of the evil was at once attacked. It was shown that peace and quietness could not be attained by special treaties of temporary and local importance, but only by strengthening the imperial policy and reorganising the government and administration of the realm; that the permanent Diet was too cumbrous an institution to expect any speedy and energetic action from it; that a council of the States of the empire would not be much better; and that the only feasible thing was an alliance. But of what elements, and how constituted? That an opportunity presented itself in the Triple Alliance, the very object of which was to guarantee the *status præsens*, to discourage dangerous agitations, and to frustrate the pretensions of ambitious Powers, such as France. The wisdom of such a proposition is next discussed at great

length. It would not do for single States of the realm to join the alliance independently. It would create dissent among the States, and give just cause for the suspicions of France. The only remedy left would therefore be, for Leopold the emperor to join as emperor and as the sovereign of Austria. As emperor he could only join if supported by his States. The object of such an alliance should, however, it was contended, be limited to preserve peace and order in the realm; and as the empire was not strong enough to afford help to others outside, like Holland and Spain, nor had ever been asked to do so, but had enough to do to protect its own members, it followed that an independent internal alliance of the emperor with the most important of the States for the purpose of home policy and home interests, was preferable. Such an alliance would create no suspicion, give no cause for complaint, and would also be able to embrace such of the States of the empire as did not approve of the policy of the Triple Alliance. But to act hand in hand with the Triple Alliance, besides being imprudent, would be useless. For neither England nor Sweden could be thoroughly relied on in their opposition to France; and Holland was only a maritime Power, which did not care for its inland neighbours nor for the Rhine; that, moreover, the Triple Alliance was not to be trusted—it showed signs of breaking up; that Charles II. of England was personally inclined towards the French, and between Sweden and France negotiations had already begun. The conclusion is expressed in Latin as follows: "Securitas imperii (is to be gained) non tam in comitiis contra externum, quam fœdere inito contra internum hostem." A discussion followed as to what form such an

internal alliance should take,—how such a welding together of the *disjecta membra* of the empire could be achieved. Once attained, it would secure to the empire the importance which it deserved as the central power in Europe, and to Europe itself a guarantee of peace and quietness. The document is worthy of being read for many reasons: it shows clearly what was the internal state of Germany at that time, what dangers were foreseen by her great statesmen, what was thought of England's first great action in foreign politics after she had for nearly half a century retired from interfering with European affairs, how the perfidy of her king was suspected, how the schemes of Louis XIV. were viewed; but the most important feature of the document is the advice given not to interfere in foreign politics, not to trust to doubtful alliances, but to establish the balance of power by a peaceful, prudent, and united home policy. We have dwelt longer on this specimen of political reasoning, as it refers to an important factor in the education of our philosopher.

The suspicions expressed in the tract written in the summer of 1670 were, within a few months, fully realised. In a continuation written at Mainz in November of the same year, Leibniz is forced to state that his fears had been only too well founded; for in the meantime Louis XIV. had attacked and annihilated the Duke of Lorraine, and had succeeded (as we now know) in breaking up the Triple Alliance by the secret treaty which Charles II., in defiance of his Ministers and Parliament, had concluded with his sister Henrietta, Duchess of Orleans, in May 1670, and which is known as the treaty of Dover. It was impossible to mistake the im-

mediate object of Louis — viz., to attack and weaken Holland. What were his intentions towards Germany? Leibniz argues that Louis was probably too prudent to aim at a universal conquest,—what he wanted was an *arbitrium rerum* — *i.e.*, he aimed at being the dictator and arbiter of European politics. To prevent a rival Power interfering, he would try and keep Spain and Austria entangled in war, nurse the feud which Charles II. was carrying on with his Parliament and people, and try to break up the unity of Germany by creating special alliances among the States of the empire. To frustrate these should, he contends, be the principal aim of German statesmanship. Already there were intrigues going on with the Elector of Cologne which must be counteracted. It is also important to notice how a defensive alliance with Holland and England is suggested. Altogether it is evident that Leibniz and his friends looked with anxiety on the ambitious plans of Louis XIV., and that they considered his policy of aggrandisement as a historical factor which required to be dealt with immediately. Nor did they limit themselves in their political discussions to the defining of the right attitude of the empire; they saw the necessity of devising some means of giving occupation to the military propensities of their dangerous neighbour, of finding an outlet for his energies. This led to that remarkable memorial addressed to Louis XIV., in which, instead of a march on Holland, an expedition to Egypt and the conquest of Turkey is suggested as a worthier object for a Christian king than the war with a small commercial community. This idea was not new. In the beginning of the fourteenth century, when the idea of a crusade was still living in the minds

of men, the Venetian Marino Sanuto, in his 'Secreta fidelium crucis,' proposed to the Pope a similar expedition. Leibniz made use of this document. The plan was favourable to the policy of the empire, because it would draw the Turks away from their repeated attacks on Hungary and Austria; and it might well be, at the same time, favourably viewed by Louis, since it would put France in possession of the greater and more valuable trade connections of the Dutch, and punish them in a manner more effectual than a European war. This great memorial was not presented to Louis; but after various changes and negotiations, two short letters—one in French, the other in Latin—referring to the scheme, were sent by Boineburg direct to Louis; accompanied by a letter of his own dated 20th January 1672, in which he proposed to send the author himself to explain the details of the plan. On the 12th February the king from St Germains replied, through his minister Arnaud de Pomponne, in a favourable spirit; and in consequence, Leibniz left Mainz for Paris on the 4th of March 1672, on his political mission.

CHAPTER III.

PARIS AND THE INVENTION OF THE DIFFERENTIAL CALCULUS.

Leibniz's journey to Paris did not realise the political ends for which it was undertaken. Nevertheless, in the general interests of science, it was perhaps the most important event in the life of the philosopher. It brought him into personal contact with the chief representatives of the new philosophy,—with followers of Descartes such as Arnaud and Malebranche, as well as with great mathematicians and physicists such as Christian Huygens. Leibniz was probably better prepared to meet these celebrities of the scientific world than to convince the king of the practicability of his political project. His own acquaintance with the recent progress of mathematics was certainly slight; and he himself relates how Huygens, who was then publishing his work on the pendulum, first introduced the higher mathematics to him, the study of which he pursued with much energy. But he was not unknown to the French Academy, nor to Antoine Arnaud, the celebrated theologian and follower of Descartes. To the former he had dedicated the second portion of a dissertation which he

published in 1671 under the title of 'Hypothesis physica nova;'[1] the latter he had in the same year addressed at length on some theological and philosophical theories. We have reserved mentioning these productions, which belong to the period of the previous chapter, because they form a suitable introduction to the studies which occupied Leibniz during his absence from Germany in the years 1672 to 1676. They show us what general views and principles had already taken hold of his mind, when out of the solitude of private contemplation he entered into the circle of the great mathematicians and philosophers of that age. They prove to us how early the first germs of the great discoveries and theories of his riper years were laid.[2]

We attach little importance to the hypothesis of a world-ether, by which Leibniz attempted to explain the phenomena of motion in the universe. Of more value for our purpose are the scattered remarks we meet with in these writings, which testify to the influence which the study of ancient and medieval philosophy—both equally ignored by Descartes and Bacon—had upon Leibniz, he being better acquainted with their mode of

[1] The first portion of this treatise was dedicated to the Royal Society of Great Britain.

[2] The writings we refer to are the following, all previous to 1672:—

1. 'Confessio naturæ contra Atheistas.

2. 'Defensio Trinitatis per nova reperta logica.'

3. 'Hypothesis physica nova,' in two parts, the first dealing with the actual forms of motion in the universe, entitled, 'Theoria motus concreti;' the second dealing with motion in the abstract, entitled 'Theoria motus abstracti.'

4. A letter of Leibniz to the Duke Johann Friedrich von Braunschweig-Lüneburg, 21st May 1671, and two letters of later date.

5. A letter of Leibniz to Antoine Arnaud, without date, but belonging to the same period.

reasoning than with that of the moderns. He followed the latter only to the extent of aiming with them at a mechanical explanation of the phenomena of nature. But no fundamental doubts had led him to discard the wisdom of the ancients, and to look in his own mind for a point of certainty, for a proposition of self-evident truth upon which to build a novel system by purely logical reasoning, as Descartes had done. Nor was he satisfied to trust merely to observation in gathering facts, and to limit his knowledge to the conclusions forced upon him by the inductive process recommended by Bacon. He was thus unlike both the Cartesians and the English natural philosophers. He was neither an idealist nor a realist. In common with the realists, he steadfastly directed his thoughts to the actual things and phenomena around him. But he was not satisfied merely to know them—*i.e.*, to measure and calculate them; he desired to understand and interpret the world. His notions about things and the world of things were to be clear, definite, and intelligible, as well as useful.

Science may, for the purpose of systematising and calculating phenomena, put up with certain notions, which, though useful, are unclear and unthinkable. Such notions are of practical, not of philosophic value. But he who strives to understand and interpret phenomena, as well as to know and measure them, will unconsciously impose two further conditions—viz., that the ultimate notions and fundamental principles he arrives at must be easily represented by the mind, and that they must be in some way connected. The mind which desires to understand, not merely to know and measure, the things

which surround us, always desires unity and harmony in its ideas.

This desire to make the observed connections and relations of things intelligible and thinkable, showed itself in Leibniz's early writings, and the inevitable consequence was, that he could not agree with the rigid contrast which the Cartesians had established between mind and matter, the two modes of existence which filled the world,—the one being conceived by them as a thinking, the other as an extended and moving substance. The observed relations of both and their connections, as well as the active, not merely passive, part which material substances play in the events of the world, made Leibniz search for a deeper principle, which should explain material as well as mental phenomena. This principle he had not found at that time, but he was in search of it.

There was, however, another consideration which, in Leibniz's mind, militated against the adoption of the seemingly unfinished though logical conclusions of the Cartesians. Originally it was probably nothing more than a habit which by degrees grew into a formal rule. It was his love of method and order, and the conviction that such order and harmony existed in the real world,[1] and that our success in understanding it depended upon the degree of method and order which we could attain in our own thoughts. This habit was acquired by his early occupation with legal and mathematical questions. We have seen how the theory of combinations and of arrangements of elements had special interest for him. We also saw how mathematical calculations served him

[1] See the 'Letter to the Duke of Braunschweig-Lüneburg.'

as the type and model of clear and orderly reasoning, and how he tried to introduce method and system into legal discussions, by reducing to a small number of terms the multitude of compound notions he had to deal with. This tendency increased in strength, and even in those early years he elaborated the idea of a general arithmetic, with a universal language of symbols, or a characteristic which should be applicable to all reasoning processes, and reduce philosophic investigations to that simplicity and certainty which the use of algebraical symbols had introduced into mathematics.

A mental attitude or habit such as this is always highly favourable for mathematical as well as for philosophical investigations. Wherever progress depends upon precision and clearness of thought, and wherever such can be gained by reducing a variety of investigations to a general method, or by bringing a multitude of notions under a common term or symbol, it proves inestimable. It necessarily imports the special qualities of numbers — viz., their continuity, infinity, and infinite divisibility—into every matter which comes under treatment; it causes the differences of things to be considered as comparable—like mathematical quantities—and destroys the notion that irreconcilable contrasts exist in nature, or gaps which cannot be bridged over. Thus, in his letter to Arnaud, Leibniz expresses it as his opinion that geometry, or the philosophy of space, forms a step to the philosophy of motion—*i.e.*, of corporeal things—and the philosophy of motion a step to the philosophy of mind.

But beyond these general tendencies and principles of thought, which had grown into mental habits, Leibniz's

philosophical writings before the year 1673 contain nothing that claims attention in this sketch. We aim at gathering on the road, along which his biography leads, the scattered elements which in later years combined to form his maturer philosophical theories. His comparative unacquaintance at that age with the higher mathematics and with the philosophy of Descartes, accounts sufficiently for the change which the study of these subjects would bring about in the course of the coming years. Having therefore put on record the contributions towards the formation of his ultimate creed which those early studies yielded, let us drop for a moment the philosophical department of his labours, and turn to the mathematical, which, during his sojourn in Paris, was principally cultivated.

It will now be necessary to give the reader some idea in what position the science of Mathematics was when Leibniz—gifted with the mental habits such as we described—met with her most distinguished representatives. The way in which Leibniz's peculiar abilities so wonderfully developed this science will then at once be seen.

The remoter causes which, in course of little more than fifty years during the seventeenth century, brought about a complete reformation in the science of mathematics, lay in the increased interest and importance which was attached to all the means of measurement and calculation, when the idea once became general that knowledge of nature depends upon exact observation, and that the meaning of *exact* is that which can be and is measured. The immediate facts, however, which mark the transition of mathematical science from a state

of inactivity to rapid development, were publications by Kepler in 1615, by Cavalieri in 1635, and by Descartes in 1637. The two former introduced, each in a different manner, the notion of infinity into geometry; the latter showed how the abstract science of measurement —viz., algebra, or general arithmetic—could be applied to geometry.

It will be evident to any one who reflects for a moment, that, in the measurements of ordinary life and of daily use, all our operations are reduced to the measurement of distances of points in space from each other; and that all other measurements are found by subsequent calculation—such as the length of lines, the area of surfaces, the volume of solids. It is true that we have become accustomed to consider the distance measured by a footrule between two points to be the length of a line which connects those points. But this supposes that the line thus measured is a straight line. If it is one of the infinite number of curves which may be drawn between the two points, our ideas of length and of distance do not coincide, and we have to resort to some other artifice to ascertain the length. The most obvious way of doing this is to select on the curve a certain number of points, measure all the distances between the successive points, and add them together. But a true curve is a line of which even the smallest measurable or conceivable portion does not coincide with a straight line, and thus it is evident that the artifice of dividing the curve by a number of points, the distances of which we take and add together, is intrinsically fallacious, and this is proved by the fact that the result may vary according to the number and position of the

different points which we select. The greater the number of points which we select, the greater the resultant or calculated length of the curve. The ancients, however, noticed that, though with the number of points the expression for the length of the curve increased, this increase had a limit, and their efforts were directed to find this limit by a method which is called the method of exhaustions. They failed, however, to generalise their methods, which depended in each individual case on some special property of the curve in question. Kepler's investigations into the cubical contents of solids, formed by the rotation of curves round a straight line as an axis (in his 'Nova Steriometria,' 1615); and Cavalieri's method of considering lines as made up of an infinite number of points, surfaces of an infinite number of lines, and solids of an infinite number of surfaces (in his 'Geometria Indivisibilium,' 1635), established a clear insight into the real difficulty. It became evident that, in order to grapple efficiently with the measurement of geometrical figures, the method of the ancients, which started with their observable — or finite — properties must be abandoned, and that they must be considered as made up of an infinite number of infinitely small parts. This, however, was not possible so long as the purely geometrical (or synthetic) method was followed. It would become possible if some algebraical expression of quantity and relation could be invented to represent geometrical figures. Such an expression would possess the properties of being infinitely divisible and continuous—properties which are absent in our geometrical representation. Descartes supplied this want by referring the points of curves to two fixed lines, in the same

way as from ancient times places on the surface of the earth and in the heavens had been referred to the equator, and to a fixed meridian,—in other words, by the measures of latitude and longitude. A curve was by this method considered to be the succession (or locus) of all the points, the longitudes and latitudes of which had a definite relation. This relation was expressed generally or algebraically, and was called the equation of the curve ; and when once found, all the properties of the curve could be found algebraically, the diagram was no longer wanted, and the synthetical process was replaced by that of analysis.[1]

It will at once be evident how mutually stimulating this union of geometry and algebra was; for not only did geometrical theorems benefit largely by the process of generalisation which algebraical expressions are capable of, but the difficulties of geometry were translated into algebraical symbols, and formed new problems for the analyst. The method of exhaustions, for instance, in which the area of a surface enclosed by a curve is found by inscribing polygons of an increasing number of sides, would, if divested of its geometrical meaning, lead to the problem of finding the sum of an infinite number of terms which themselves decreased according to some rule (*i.e.*, the summation of an infinite series). And indeed, the next great step taken after Descartes was by Wallis, the Savilian professor at Oxford, who, in 1655, published his 'Arithmetica

[1] It is evident that geometrical figures can be considered also as to their configuration, independent of measurement of their magnitudes. This purely geometrical or synthetic consideration was neglected for some time over the great practical value of the analytic method. It was, however, revived by Monge in the eighteenth century.

Infinitorum,' in which, following in Cavalieri's footsteps, he determined the areas enclosed by curves (the so-called quadrature of curves) by investigating the properties of infinite series.

When Leibniz left Mainz for Paris, it appears that he was acquainted with Cavalieri's book, and that he had heard of Wallis; it is, however, more than probable that he knew nothing of Descartes' application of algebra to geometry, and he was certainly unacquainted with the labours of the other great French and English mathematicians. We cannot look upon the remarks contained in the second part of the 'Hypothesis physica nova,' or in his letters to Arnaud, as containing the germs of the great invention which he made a few years later; it is, however, clear from these writings that he had accustomed himself to look upon finite quantities, mathematically and philosophically, as made up of an infinite number of infinitely small parts. Using the expression which later on he himself invented, we may say he then already looked upon mathematical quantities as integrals in the manner which Cavalieri had suggested.

There was, however, another way of looking at curves, and this also was inherited from the ancient geometricians, which, if translated into the general language of algebra, would suggest problems involving the idea of infinitely small quantities. This was the idea of looking at curves as generated by the movement of a point, this point having to obey certain laws of motion, or being under the influence of certain forces. To make the subject generally intelligible, let us suppose that a ship, the position of which is registered by the captain

by marking its latitude and longitude on the chart, would, if permitted to follow the direction of the wind alone, take a course due N.E.; it is evident that (assuming the surface of the ocean to be a plane), during a given time, the latitude and the longitude of the ship would increase equally—*i.e.*, the ship would sail as much north as east. Now assume that, in order to alter the course of the ship, the steersman exerted a certain pressure on the rudder, and that he varied this pressure gradually and uniformly: it is evident now that the respective increase of latitude and longitude would vary with every moment, and the course of the ship would not be a straight line in the direction of N.E., but a curve. We could describe the curve if for every moment we knew the relative increase of latitude and longitude dependent on the force of the wind and the pressure exerted on the rudder. As this does not remain the same, the relative increase of latitude and longitude will change for every point. If for a moment it did not change, then the ship would proceed in the tangent to the curve (*i.e.*, in the line which touches the curve) in that point, and the position of this tangent would be known by knowing the proportional increase of the latitude and longitude depending on those two forces at that moment. The course or direction of the ship cannot be considered to be the same for any finite length of time, but for an infinitely short period the course of the ship would be indicated by the proportional increase of latitude and longitude dependent upon the force of the wind and the position of the rudder at that moment. Although, therefore, the increments of latitude and longitude change their proportion continually, and only

retain it for an infinitely small period, this proportion is a finite quantity, and we have here the idea of a quantity which, itself finite, is the proportion of two infinitely small quantities.

The object of this illustration is to show how the problems of geometry forced upon the analyst the notion of infinitely small quantities, in so far as the length or area of curves can only be brought under our ideas of measurement if we can look upon a finite quantity as the sum of an infinitely large number of terms, each infinitely small; and the direction of a curve at any point can only be fixed if we consider it as the relation (or ratio) of two infinitely small quantities. If the problem to find the sum of an infinite number of infinitely small quantities led to the invention of the integral calculus, the other led to that of the differential calculus. In giving these terms, and in trying to give an idea of the question at stake in the general manner we have done, we have, however, historically anticipated the progress of the inventions of that age. It was more in attempting to solve special problems, belonging to the one or the other class, that mathematicians were engaged, and that much had been done by Descartes, Fermat, Roberval, Wallis, and Barrow. The real invention of the infinitesimal calculus was the conception of these problems as depending all upon one and the same mental operation, the invention of a method of general—not only special—value, and the fixing of this method by notation and terms.

It was clear that this had not been done by the great French mathematicians when Leibniz in the year 1672 mixed with them, and became gradually acquainted with

their labours. His great readiness to enter into the ideas and pursuits of other thinkers, his inclination to follow up every argument and train of thought to its fundamental meaning, and his power of generalisation, singled him out as one who would be a welcome and successful worker in the new field of research. However, it took him some time before he fathomed the question, and in the beginning his inventive powers were fascinated by more mechanical contrivances—among others, by the idea of Pascal's calculating machine. He himself set to work and constructed a similar but more perfect and efficient machine, which was much admired by competent authorities. In the midst of these pursuits, more mechanical than theoretical, Leibniz was interrupted by his journey to London. The Archbishop of Mainz had sent an ambassador to the Court of Louis XIV. in order to negotiate the preliminaries of peace between the belligerent Powers, with instructions to proceed to London in case they did not succeed with their plans in Paris. The principal object was to arrange for a Congress in Cologne, at which all the matters at issue should be settled. Both Louis and Charles II. wished to bring about a settlement by a number of separate treaties to be concluded in separate places. When the embassy went to London, Leibniz was attached to it, and he spent about seven weeks there, returning to Paris in March of that year,—earlier than had been intended, on account of the unexpected death of the great archbishop. The object of the mission, however, had been gained, and the conference met in Cologne in June 1673.

Not many months previous to his departure for London, Leibniz had suffered a great loss in the death of

his patron, the Baron Boineburg. The death of the two great men whose names will ever be associated with the youthful story of Leibniz, marked for him the transition from youth to manhood and independence. He could no longer look upon Mainz as his home. He had now to resolve upon a change of some kind; and partly from his inability to find a satisfactory position combined with congenial employment, partly in order to look after some private business of the family of Boineburg, mostly perhaps on account of the attraction which the society of the *savants* exercised on him, he resolved in the meantime to remain in Paris. He now — as he himself informs us[1] — betook himself more seriously and systematically to the study of mathematics. The geometry of Descartes and the unsolved problems which it suggested specially attracted him; and as early as 1673, fragments among his remaining manuscripts prove to us that he tried to formulate the problems of drawing tangents and finding the areas of curves in a more general manner, which should embrace all kinds of curves. He also very soon found that his early studies regarding the properties and combinations of numbers, of their sums and differences, and of the differences of differences, were closely allied to the problems which occupied him at that time. Instead of dealing with finite differences as he had done then, he had now infinitely small differences and their sums to consider. Through a series of investigations and discoveries[2] which lasted more than two years, of which

[1] See 'Historia et origo calculi differentialis,' Math. Works, vol. v. p. 398.

[2] The most important of which was an expression in form of an in-

Leibniz himself has given several accounts, he succeeded at last, towards the end of 1675, in defining the general problem more clearly, and in fixing the well-known notation or algorithm of the differential as well as that of the integral calculus; and before his departure from Paris towards the end of the following year, he found himself in possession of most of the elementary rules and formulæ of the infinitesimal calculus.[1]

The account which Leibniz himself has given of the gradual development of his mathematical knowledge and of the history of his great invention is so consistent, and so well borne out by external and internal evidence, that we might dismiss the matter with the short explanations we have given, were it not for the great controversy which later on arose as to the invention of the infinitesimal calculus—a controversy of such importance not only to the memory of Leibniz, but also to the progress of mathematical science, that no sketch of Leibniz's life can be complete without a notice of the main points at issue.

Our narrative so far has shown that we consider Leibniz's invention to be the necessary logical outcome of the course which his mathematical studies had taken. This was doubtless influenced by the strong bias of his mind, which cared more for general principles

finite series of the ratio of the diameter and circumference of the circle.

[1] The principal authorities and sources of information on this subject are :—

1. 'Historia et origo calculi differentialis,' Math. Works.
2. A letter of Leibniz to Jacob Bernoulli, dated 1703, *ibid.*, III. i. 71.
3. Dr C. J. Gerhardt, 'Die Entdeckung der Diff.-Rechnung durch Leibniz.' Halle: 1848.

than for isolated applications, and which attempted to further scientific inquiry by reducing all the problems which might present themselves, as well as the methods of solving them, to general forms, aided by symbols. It is now patent to every one who peruses the mathematical writings of that age, that nothing more than a generalisation, a name, and an algorithm were wanted to establish the calculus. It is quite as clearly established that Sir Isaac Newton had been working in the same direction, and that he must have been as early as 1665 (or ten years before Leibniz made use of his notation) in possession of general methods, of which he made extensive use. Nothing of this was, however, publicly known, his communications regarding his invention having been limited to a few friends in his own intimate circle. The question then is this, whether Leibniz, through private channels, received any intimation of Newton's discoveries, or of his invention—assuming that such discoveries had really crystallised in the form of a fixed notation? The only channel through which Leibniz could have got any information was from Oldenburg, a countryman of his, who occupied the position of secretary to the Royal Society. With him Leibniz had been in correspondence since the year 1670. Through him he had presented in 1671 the first part of his 'Hypothesis physica nova' to the Royal Society, and had procured English books by his assistance. Oldenburg transmitted to him the opinion of Wallis on the first and second part of the 'Hypothesis.' It does not appear, however, that his correspondence touched on mathematical subjects; and even when in London, early in 1673, his interests lay more in the direction of mechanical appliances and

physical experiments. His first visit to London had incidentally the effect of drawing his attention closer to mathematical subjects. It happened that one day, at Robert Boyle's house, he met the mathematician Pell, and explained to him some of the methods which he had invented for himself with regard to numbers, and the summation of series of finite numbers; whereupon the latter remarked, that in a work by Mouton a similar formula by Regnaud had been published as early as 1670. Pell also drew Leibniz's attention to Mercator's work on the rectification of the hyperbola. These books Leibniz procured for himself, and finding much in them that was unknown to him, he began, on his return to Paris, to study mathematics more systematically, with Huygens as his principal master. During this period, and up to his departure from Paris, he carried on a correspondence with Oldenburg, communicating to him freely the progress he was making, especially in the investigation of infinite series, with which he was principally occupied. He requested Oldenburg to let him know what the English mathematicians thought of his labours, and to communicate to him what progress they were making. Among other discoveries, Leibniz announced to Oldenburg the expression—in the form of an infinite series—which he had found for the ratio of the circumference to the diameter of the circle. And as Oldenburg in return reported that both Gregory and Newton had found similar expressions of more general value, which also referred to the circle, Leibniz expressed a wish to know more about these. Oldenburg sent him in course, 26th July 1676, a copy of a long letter from Newton, dated Cambridge,

13th June 1676,[1] in which the latter communicates his celebrated binomial theorem, and other mathematical expressions referring to the arc of the ellipsis, &c. The method he employed he called the extraction of roots, and accompanied his theorems by brief demonstrations. In reply to this, Leibniz pointed out, 27th August 1676, the difference of the method which he had employed, mentioned its great generality, being in fact the method of indivisibles in its most general conception, and he further proceeded to show its application. Without making use of his new notation, he traced the method back to the *ars combinatoria*, the study of which had attracted him so early. He asked again for further explanations from Newton. This letter, of which Biot says that it must have proved to Newton that Leibniz was on the way to find a method similar to the one he possessed, if he had not found it already, drew forth Newton's celebrated letter of 24th October 1676, in which he gives a kind of history of his investigations, and on approaching the general methods which he possessed, conceals the statement of the general problems involved in two anagrams. It was evident he did not wish to explain clearly what his invention consisted in, but desired to say enough to establish the fact that he had found general methods.

The motives for this reticence of Sir Isaac Newton have been a subject of much discussion, and of many suppositions. It is, however, only fair to mention that his way of acting was not without precedent. Galileo

[1] It is well to note that this letter was written after the date of Leibniz's first manuscript containing the use of the notation of the integral calculus.

had been in the habit of giving his discoveries to his friends in the form of anagrams, and noting the date, in order to establish his priority. Academies and learned societies used to exercise the office of trustee, who received communications from discoverers and inventors on deposit, thus protecting the rights of their authors. Newton had done this in 1671 with his catoptrical telescope. In the same way he deposited the invention of his infinitesimal calculus in the form of anagrams in the hands of his rival. There existed in those ages great jealousy between the learned, and a desire to conceal as much as possible, and mathematicians frequently published their theorems without proofs or demonstrations.

We shall see in a future chapter how Leibniz in the following year replied to Newton by giving an unreserved exposition of the new method, employing the well-known notation of the differential calculus. But there are two points which require to be mentioned before proceeding with the narrative.

The first refers to Newton's infinitesimal method itself. We have seen that Leibniz had a method and a fixed notation as early as 1676. Nor can there be any doubt that Sir Isaac Newton had a similar method as far back as 1665. It is not quite certain when he first fixed the notation in connection with the well-known terms of moment (denoting by this what Leibniz later on called differential), fluxion and fluent; but it appears that the ideas involved in the new method were familiar to him before he established a rigorous algorithm. In fact the early writers on fluxions, after Newton, used the words moment, fluxion, and differential as synonymous. The algorithm of the integral also was undecided, and it was

considered by Newton merely as the inverse of the fluxion; whereas it seems that Leibniz, being occupied with the summation of series, used the long *s* as an algorithm previous to the use of the *d* as the algorithm of the differential calculus. Leibniz looked upon the integral as a sum—probably before he defined its relation to the differential, the algorithm of which was introduced immediately afterwards.

Though the result is the same, Newton evidently arrived at his method and notation by looking for the finite quantity which was the proportion of two infinitely small quantities, this finite quantity being the proportion of the velocities or infinitely small increments in the motion of the ship to north and east in our example on pp. 50, 51; whereas Leibniz arrived at his method by looking for the finite sum of an infinite number of infinitely small quantities, see pp. 47, 48.

Philosophically there was, however, a much greater difference between the fluxionary and the differential calculus. It is evident that Sir Isaac Newton hit upon the method of fluxions in trying to solve certain mathematical problems; but that he did not perfect it systematically, and that he allowed the matter to rest for several years, pursuing his investigations on the phenomena of colour and of attraction. In his communication of it to his friends, Dr Barrow and Collins, in 1669, he avoids discussing the principle, but gives some of his results. In working out the calculations of the 'Principia,' the fundamental proposition of which was sent by him to London in 1684, Newton must have made extensive use of the calculus of fluxions, and must have greatly extended and improved his methods; but in the printed

demonstrations of this great work no use is made of the new method, and even in the only passage where a theorem of the calculus is given, no use is made of special terms or notations. Taking all these facts together, we conclude that Newton cared more for the results than for the method and the principle. Leibniz, on the other hand, was in search of fundamental principles, and anxious to arrive at simplifications and generalisations; and once having been led to study infinitesimals and series, he—following on the line of his early treatise, 'De arte combinatoria,'—did not rest till he had found a general and simple method, and fixed it by a clear and transparent notation.

Leibniz did not receive Newton's letter to Oldenburg till he arrived in Germany. Since the death of Boineburg, he had been carrying on negotiations with several German princes, with the view of obtaining a similar position to that which he had filled at Mainz, and in the meantime he remained in Paris, supplementing his private income, which the disturbed state of affairs had rendered more precarious, by fees which he received for legal affidavits. Ultimately, the repeated offers of the Duke, John Frederick of Braunschweig-Lüneburg, with whom he had for some years carried on a scientific correspondence, prevailed over Leibniz's reluctance, and he accepted the post of librarian and private councillor to the duke at his court in Hanover. He left Paris in the midst of his scientific labours, and returned by way of London, where he stayed a week, and made the acquaintance of Collins. From London he proceeded to Amsterdam, visiting the mathematician Hudde, and to the Hague, where he had an interview

with Spinoza, who was at that time counted among the followers of Descartes, and arrived in Hanover in the last days of the year 1676.

Whilst Leibniz was in London, Newton was composing his celebrated letter to Oldenburg, which did not reach Leibniz till the following year.

CHAPTER IV.

HANOVER.—THE PHILOSOPHER AND ACADEMICIAN.

The resolve of Leibniz to exchange the liberty of his Parisian life, devoted almost exclusively to science, for the office of librarian and councillor at the court of a small German prince, decided the rest of his life. His biographers have regarded it with more or less disfavour, regretting that the talents of such a genius should have been wasted in the composition of tracts of purely local or temporary value, in aiding the Duke of Braunschweig-Lüneburg in his unpatriotic and particularistic policy, in writing the history of an obscure German dynasty, or in composing memorials referring to the administration of a small state. Against this may be remarked that such a position afforded probably more liberty of thought, and certainly more leisure, than a chair at one of the German universities; that Leibniz's political tracts were conceived in a wide and patriotic spirit; that he had the faculty of looking upon small things as reflecting the affairs and interests of the world and mankind at large; that the smaller German States were the relics of great and powerful dynasties, which vied with each other in gaining a

leading position in the politics of the whole nation.[1] In this struggle, which in our age is approaching its end, only one among the many could be ultimately successful; and if it was the destiny of the electors of Prussia, with whose court Leibniz became later on connected, to be the ancestors of the rulers of re-united Germany, it was on the other hand the fate of the house of Brunswick, the history of which formed Leibniz's official study, to revive the forgotten glories of Albert Azo of Este and of Henry the Lion in the reigning dynasty of Great Britain. It may also be noted that, in pursuit of his genealogical studies, Leibniz made a learned pilgrimage through Germany and Italy; that his inquiries roused the princes of Este to appoint the celebrated Muratori to rescue from oblivion the treasures of the library of Modena; and that, after completing perhaps the greatest work of modern history, the illustrious Gibbon turned to the works of Leibniz and Muratori as the sources for his history of the Antiquities of the House of Brunswick. Nor is it uninteresting to note that the ancient stories of the Guelphs and Ghibellines, which fill the pages of these Antiquities, form the historical background of one of the most unique poems of our age.[2]

However, the interests of the Duke, John Frederick of Hanover, were not limited to purely selfish ends. Though his personal dignity and the claims of his dynasty were an object of prime importance to him, he did not neglect the duties of administration. It

[1] See Leibniz's Remarks in his Letter to P. Bayle. Erdmann, p. 193.

[2] See Gibbon's Miscellaneous Works and R. Browning's "Sordello."

was to him that the mining operations in the Harz Mountains owed their great development in the seventeenth century. Leibniz took a lively interest in this important industry, and his geological work, 'Protogäa' (1691), a sort of history of the formation of the earth, was suggested by his observations. In a similar manner, the coining of the silver found in the Harz Mountains induced Leibniz to consider the important question of currency. As in every other branch, his reflections on this subject were dictated by a regard for the general, not the purely local and temporary, aspects of the subject; and the patriotic spirit which he had imbibed under the guidance of Boineburg and Schönborn, is manifest in these and many other instances, the welfare of the realm suggesting to him the propriety of publishing 'Consultationes Germanicæ.' Adverse political events prevented the carrying out of this, as well as many other patriotic plans.

But the most important of all the practical problems to which Leibniz devoted himself, moved no doubt by the influences which surrounded him during the whole of his life, was the question of the reunion of the two Churches. The fact that the Thirty Years' War had ended in a drawn battle, so far as the two religions were concerned; that many intelligent rulers—such as Ernest of Hessen-Rheinfels, John Frederick of Hanover, and men of the standing of Boineburg, had gone back to the Catholic faith; the circumstance of Leibniz's employment in the service of the great Catholic Bishop of Mainz; his friendship with Antoine Arnaud, and afterwards with Bossuet,—all these will sufficiently account for the interest he took in the great controversy of his

age, and for the negotiations which he carried on with the object of amalgamating the creed and constitution of the two Churches.

It is only to give the reader some idea of the occupations of Leibniz after he settled in Hanover that we have anticipated our short narrative, a portion of which will, at the right moment, be devoted to the controversies inevitable in the life of one so original, so many-sided, so accessible to and so appreciative of opposite influences. The main object of this chapter is to trace the growth of his central philosophical ideas, and to understand on what lines he arrived at the notions peculiar to him.

During his sojourn in Paris, Leibniz had come under the influence of Descartes' philosophy, as he had likewise become acquainted with his mathematical discoveries. We saw how, following the lines of his early mathematical writings, he was led to perfect Descartes' ideas, and to crown them by the invention of a new calculus. The critical writings of Leibniz in the years immediately following his departure from Paris, show us plainly how, simultaneously with transcending Descartes in mathematics, he recognised the necessity of superseding his philosophical teachings. As there was wanting in Descartes' mathematical labours the unity of a principle, of a new method and notation, in order to deal efficiently with continuous and infinitely variable quantities, so there was wanting in his philosophy, which established the existence of two substances,—the one extended, the other thinking; the one matter, the other mind,—the unity of a common principle, actuating and uniting both. Leibniz came early to the conviction

that neither extension nor motion could be the essence of corporeal things, nor thinking the essence of mind. They were only the forms, the appearance, of their existence. But in his study of mechanics, and especially of dynamics (as the laws of motion), we find the transition from his criticism of the mathematics of Descartes to his criticism of the Cartesian philosophy. Here he soon found that the belief that motion formed the essence of corporeal things had led the Cartesians into the error of maintaining that the quantity of motion in the universe—*i.e.*, the product of the moving masses and their velocities—is a constant or unalterable quantity. Leibniz soon convinced himself that this law did not agree with facts, although it was a necessary consequence of Descartes' view, according to which all motion is communicated to material things from without; and that a mechanical explanation of nature, which permitted no repeated interference on the part of the original moving cause, was only possible on the assumption that the amount of motion once communicated remained the same in quantity. In changing, therefore, the measure of force —defining it as the product of the mass and the square of the velocity—Leibniz concluded that corporeal things or matter could not be looked upon as dead and inert masses, receiving their motion from some external prime cause, but that they must contain some principle of their own, which is preserved in motion as well as in rest.

A reflection of deeper value underlies these arguments. It was a firm conviction of Leibniz that natural processes must be explained mechanically,—that is to say, by the aid of unalterable laws inherent in the existing nature of things. This conviction made him

prefer the philosophy of the moderns to that of the schoolmen. But in order to act mechanically, the things of this world must be conceived as having such an original constitution as will make it intelligible how they can act according to certain fixed laws. In other words, the fixed laws must be the essence and the very nature of the things themselves.

It is clear that Leibniz, in thus searching for a conception which would make phenomena intelligible, had before him a clear appreciation of the difference between the scientific and the philosophical treatment of a subject. He did not wish to encumber scientific progress by the introduction of metaphysical notions of entities and substantial forms, so recently and so beneficially expelled. Scientific progress and knowledge begins with simple definitions regarding observable and measurable relations and quantities. The geometrician need not entangle himself in the famous labyrinth of the "nature of the continuous"; nor need the practical moralist, still less the lawyer or politician, trouble himself with the difficulty of reconciling free-will with the providence of God. But these subjects form the problems of philosophy. Science proceeds on the basis of certain formulæ expressive of matters of fact. To find such formulæ with appropriate symbols, is the beginning of scientific research. Nobody has done more than Leibniz in this direction, nor more clearly recommended the reducing of all scientific discussion to definite terms; but he knew well that whilst these definitions, these measurable and calculable quantities, suffice for observing, classifying, and measuring phenomena, they cannot make phenomena intelligible to us. The real essence,

which underlies these simple statements and definitions, must be represented in some intelligible and thinkable conception. This is the object of philosophy.

It was with this object in view that Leibniz introduced again into philosophy the idea of the substance which underlies phenomena, and that he resumed the inquiry into the essence of things. Not merely the quantity of motion in moving bodies, but the force which is situated in them (the *potentia in corpore* τὸ δυναμικόν, *seu principium mutationis et perseverantiæ insitum*), in one word the power, must be recognised and inquired into.

But these considerations were prompted by other and still more important interests. We have seen how early in life Leibniz was actuated by two distinct desires in his study of things—by the desire to know and think clearly, but not less by the wish to do everything for a purpose, and to see in everything a purpose and a use. As he rose to the higher aspect and deeper meaning of things, these tendencies became more clearly defined. Clearness and precision of thought meant for him more and more the mathematical and mechanical treatment of scientific problems, while, at the same time, his regard for the practically useful attained a higher significance. It meant that everything in the world had a deeper sense, a meaning, a purpose ; that the universe had been created for an end, and that this end was being achieved through the mechanical laws which are the external formulæ of the internal essence of things. It was because Leibniz had as much interest and belief in final as he had in mechanical or efficient causes, that he insisted upon a more profound examination of both, that he searched for

a conception which would permit of the recognition of both. He could not admit final causes, as interfering with or overriding the unalterable mechanism of everything; but it was quite intelligible and reasonable that the mechanism of nature was only the means chosen by the Creator for the realisation of certain ends,—that the totality of everything, not the single phenomenon or the isolated fact, had a purpose. From this point of view philosophy had for its object the discovery of the meaning and idea of things, whilst science had for its object the connection of things. The latter, pursued by itself, resting satisfied with the mathematical formula for a mechanical law, regarding the Creator merely as the extramundane cause of this law, but without a living connection with things, must lead — so it seemed to Leibniz—to irreligion. This, he maintained, was the inevitable result of Descartes' philosophy, logically continued. To prevent this, a deeper conception of the substance of things, of their essence, not merely of their forms of appearing and acting, was needed.

It was thus neither the pure desire for knowledge which actuated Leibniz in his speculations, nor merely the wish to make this knowledge useful. He agreed with the modern masters of science as to the right methods of scientific research; but he saw that to rest contented with these methods would be to lose that which ancient philosophy had established, and which he himself admired in Plato and Aristotle—viz., the ideal and spiritual view of things; that it would be to forget the design which was realised in the life of nature and of man. And he was far-sighted enough to foresee that with this would be lost the religious aspect of things.

Leibniz was not contented to establish—as Lord Bacon had done, and as so many English philosophers were doing—a kind of truce between science and religion, between philosophy and theology. Nor was the external and mechanical relation between God and the world, which Descartes taught, more satisfactory to him. His philosophy was, if not more practical, certainly more radical than Lord Bacon's, inasmuch as it sought more for principles than for their application. His religion was more real and lifelike than that of Descartes; not a matter of merely nominal importance, leaving it undecided what his creed really was, but a great concern, which occupied throughout life much of his time and thought. Leibniz's philosophy was thus the attempt to reconcile two ways of looking at things, the ancient and the modern, the theological and the mechanical, the religious and the scientific. He desired to give all possible scope to scientific research, all possible breadth to knowledge; but not less did he wish to give all possible depth and reality to religious belief.

But to believe in a different order of things from the mechanical, means to believe in realities and essences, which differ from each other not merely by measurable quantities, such as motion and extension, but by qualitative differences; to look at things not merely so far as extension and position are concerned, but to be of opinion that, after you have divided into infinity and reached the mathematical point, wherever you have something real before you, you have not exhausted reality; but that you have to dive, so to say, into the depths of an internal (intensive not extensive) existence, in which are revealed the real essence and individuality of things,

the source and centre of that power which is the internal cause of all external phenomena—of all the phenomena of motion and extension.

In much of this reasoning Leibniz was preceded by thinkers of the old world as well as by those of his age. To understand how he came to fix upon the central idea of his philosophy, we have to remind the reader of some of these antecedent theories.

The discovery that Descartes' law of the preservation of the quantity of motion was incorrect led Leibniz to look for something in matter besides mere extension; this something was force or power, which may be there even when the body is at rest, as in the spring which is wound up, or in the weight which is prevented from falling. This suggested to him the idea that this principle which underlies material things is something analogous to the power we experience in our own selves; and at once destroyed the apparent contrast which Descartes had maintained between mind and matter. His appreciation of the mechanical way of explaining natural phenomena, however, forced him to retain the method of considering physical bodies as aggregates of particles or atoms, as Epicurus had done, and as those moderns, who adopted his view, had done. But these atoms could not be extended if they were to contain an unextended principle, otherwise by subdivision the unity would be again destroyed; and if matter were not infinitely divisible, the continuity of phenomena would suffer, and the mathematical process of considering finite quantities as composed of an infinite number of infinitely small quantities, would be incorrect. In this way Leibniz escaped the consequences of Descartes' philosophy, — viz., the

atomism of Gassendi (and of Epicurus), according to which matter consisted of physical particles; and the doctrine of Spinoza, according to which there was only one universal substance. Leibniz held that there were atoms, not physical or extended particles, but mathematical points. Their extension was zero, but their intensity was infinite, like that of the human mind. These simple beings, with no extension, but endowed with the depth of an internal life, Leibniz called monads, to distinguish them from atoms. This term had been used before by the Italian philosopher Giordano Bruno (1548 to 1600) in a similar but not in precisely the same sense as Leibniz used it.

The idea of the monad is the central and characteristic conception of Leibniz's philosophy. Having gained it, he had arrived at what seemed to him a satisfactory solution of the main philosophical problem.[1] But this was, according to his own confession, after many changes and various attempts, and seems to have happened about 1685, in his fortieth year. His correspondence with Arnaud, which began in the year 1686, contains in the first letter (dated Feb. 1686) a pretty complete synopsis of his principal views, of which the idea of the monad (an expression which Leibniz did not adopt till 1697) is the centre and starting-point. His whole philosophical system is represented as a necessary consequence of this idea. In the same year (1686) he communicated his ideas to Simon Foucher, with whom he had become acquainted in Paris, and with whose endeavours to revive the study of the Platonic philosophy he sympathised.

[1] See Opera, Dutens, vol. vi. p. 253.

In a separate chapter we must resume the thread which we now break; and—beginning with the idea which we here represent as the result of many years of meditation and of many-sided influences—develop the system of Leibniz's philosophy in the form in which, after the year 1685, it was on various occasions made known to a small circle of friends, and later on to the world at large. But the remaining story of his life has for us not only the interest of exhibiting the manifold forms in which his ideas presented themselves to him, the numberless applications of the truths he had discovered, and the methods he had invented, nor do the many controversies in which he was entangled represent the whole of his literary activity. It is evident that Leibniz himself was not satisfied with the height which he had reached, and that he was labouring at the solution of problems of more general interest than the doctrine of monads, and of greater utility than even the infinitesimal calculus. In these endeavours he was not destined to be successful; but no picture of the man and his life would be complete without a record of the investigations which occupied a great portion of his time and thought. The first part of this essay will thus have still to deal with two important subjects—the controversies in which Leibniz was entangled; and the scientific projects which he did not realise.

Before entering on these matters, we have to prefix some remarks on the general nature of Leibniz's erudition, and the channels through which it became the property of the public. In this respect he occupied a unique position in the literary history of Germany in his age. When he left Leipzig in 1665, still more

when, a year after, he refused the tempting offer of a chair in Altdorf, the fate of his life was decided. He was to be of a different stamp from the university professor, his learning was to be enlivened by a different spirit. The society of Boineburg and Schönborn, the intelligent circles in which he moved in Paris and London, gave cosmopolitism and many-sidedness to his interests, and gave his manners and his style both urbanity and a remarkable degree of accommodative power. The learned Latin had gradually to make room for the politer French; the strict form of dissertation yielded to the more graceful dialogue. The text-book of the teacher was superseded by the lighter form dictated by varied and occasional requirements; and instead of lectures, an extensive correspondence formed the channel through which the ideas of a new science and a new philosophy were gradually diffused among a matured—not a juvenile—class of readers. Besides this, Leibniz wrote extensively for the recently (1682) founded 'Acta Eruditorum,'[1] a partial imitation of the French 'Journal des Savans' (founded by Sallo in 1665), and the first literary and scientific review published in Germany, though in the Latin tongue. The most characteristic sphere, however, for Leibniz's literary and scientific labours was that which he was the first to introduce into Germany—viz., the learned Academies. For these he had the model of the French Academy of Sciences (founded in 1666, under the auspices of Colbert), the Royal Society of London (founded in 1662, but dating in its germs from the meetings of Wallis and others, instituted in 1645), and the Academy del

[1] Usually known by the name of 'Leipzig Acts.'

Cimento of Florence (founded in 1657, under the care of Leopold, brother to the Grand Duke Ferdinand II.)[1] Of these Leibniz was best acquainted with the French Academy, with the members of which he had stood in intimate relations during his sojourn in the French capital. His ideas, however, regarding the advancement of learning and the promotion of civilisation were of a still earlier date, and may have originated in his experience as secretary of the secret society of Nürnberg. For a mind like his put all events and observations to good and fruitful account.[2] Thus as early as 1668 he suggests, in his 'De una ratione reformandi rem literariam meditationes,' the formation of a society "rei literariæ stabiliendæ causa."[3] Such a society was not only to promote literary and scientific work, and to join its labours with those of France, England, and Italy, but also to have a supervision over manufactures and trade. Leibniz's ideas regarding such a society —as seen in the earlier drafts which have been found among his manuscripts—were of a wide and elevated character, perhaps too much so to become immediately fruitful and practical. The furtherance of the general welfare, the love of God, the promotion of happiness and of universal harmony, are the ends and motives which dictate his remarks and propositions. But more especially does he point to the need in which Germany stands of some active and organised co-operation, to enable her to take her place among the civilised nations.

[1] Hallam, Literary History, Pt. IV. chap. viii.

[2] On the whole of this subject see especially the seventh volume of Foucher de Careil's Œuvres de Leibniz, entitled, 'L. et les Académies.

[3] *Ibid.*, p. 21.

The country which, as he himself had seen in Nürnberg, showed the remains of former greatness in arts and industry—which had produced an Albert Dürer, and, through Kepler, Copernicus, and Tycho Brahe, had led the van in science—exhibited then a complete decay of manufactures and trade, of military power, jurisdiction, and government. The land which boasted of having produced the beginnings and germs of civilisation had left to others the glory of developing and utilising them. Look at England, France, and Italy, he exclaims, with their organisations of academies and societies, their philosophical transactions, their 'Journal des Sçavans' and 'Giornale di litterati.'

There can be little doubt that the example of France, England, and Italy, where royal and princely protection had founded and endowed centres of learning and research, was prominently before Leibniz's mind when, on many occasions during his busy life, he addressed himself to those in power and position regarding his projects for academies and learned societies. He thought it lay in their power to do much good in this direction. And it may be that it was more from this than from any other desire that he courted their friendship, relished their society, and ultimately settled down as one of their humble servants. It is clear that, when the prospect was before him of an engagement at the Court of Hanover, he did not accept it without much consideration and hesitation; and in his correspondence with Professor Conring we have a vindication of the new road which he had chosen, not without a significant hint at what he considered the defects and the narrowness of German university life. During the years

of his residence in Paris he penned—*proprio motu*—a second draft for the formation of a German society, "quæ scientias artesque maxime utiles vitæ nostra lingua describat patriæque honorem vindicet." He thinks it best to suppress his name, "donec re procedente successus ipse ab omni vanitatis aut captationis eum suspicione absolvat." The Duke John Frederick died in December 1669, and was succeeded by his brother, Ernest Augustus, then Prince of Osnabrück, who confirmed Leibniz's appointment. Other offers had been made to him (one from Denmark), which he declined. One of the first reports which Leibniz made to his new master, was on the foundation or enlargement of archives, libraries, and a museum in the duchy. Ten years later we find him in correspondence with two eminent historians, Ludolf and Paullini, regarding a German historical society, which, according to his ideas, should be organised on the same principle as the foreign societies for the promotion of the experimental sciences, so as to secure the co-operation of local historians and collect provincial authorities, and thus to lay the foundation for a universal history. Leibniz was competent to advise on such matters, for by this time the task of writing the 'Annals of the House of Brunswick' had developed under his care into an important chapter of the history of medieval and modern Europe. Limited as the field might seem, it had grown to a large and extensive area, and the events of nations and of the world seemed reflected in the fate of a dynasty. In order to forward the interests of this work, Leibniz had, in the year 1687, started on a journey through the different countries of the German empire to Vienna,

where he remained nine months; thence he went to Venice, Rome, and Naples, and back by Florence, Bologna, Modena, Venice, and Vienna to Hanover, arriving there in 1690, after having been absent more than two years. This journey was of the greatest importance to Leibniz. Everywhere he explored archives and collections, made valuable acquaintances, and formed lasting connections.

But it was not till Leibniz's influence extended beyond the interests of the house of Hanover, that his plans were matured and sprang into life. The marriage of the Duke Ernest Augustus with Sophia, daughter of Elizabeth of the Palatinate, and granddaughter of James I. of England, as well as that of her daughter, Sophia Charlotte, with the first King of Prussia, increased the political importance of the house of Brunswick; and as these connections promised to revive the fortunes of the Guelphs, they opened for Leibniz a wider field of action. Nor were these illustrious women slow in recognising the novelty of his philosophical as well as the value of his practical ideas. It was in conversations with Sophia Charlotte over Pierre Bayle's writings that the foundations were laid of Leibniz's greatest philosophical work, the 'Théodicée'; and again it was she who conceived the idea of doing something for the cultivation of science in Berlin. In both cases the materials lay for many years prepared in the mind of Leibniz, waiting only for opportunities to take definite shape and form.

It was in the autumn of the year 1697 that the plan of founding an academy in Berlin was ventilated: in connection with it that of transferring Leibniz from

Hanover to Berlin. In the same year he prepared a Memoire "pour les deux Electrices," proposing that he should be placed in such a position as would permit him to promote the scheme. It was, however, not till three years later that the Elector of Brandenburg—afterwards the first King of Prussia—gave his formal sanction to the erection of an observatory and the foundation of a society, which was accordingly put into effect on the 11th July of that year, Leibniz being nominated the first president on the following day. Little was done for many years. The wars which broke out absorbed the attention and means of the Government; and Leibniz, whom Frederick the Great called an academy in himself, did not reap the satisfaction and pleasure which his great and favourite scheme should have secured for him.

It was therefore not surprising, but quite consistent, that Leibniz availed himself of every opportunity to put his ideas regarding the promotion of science and culture into effect through other academies and societies; that even the wider sphere of action, which his new duties as president of the Berlin Society and his frequent visits to Berlin had opened out, became too narrow, and that he cast furtive glances towards other powerful and enterprising potentates. To consider the negotiations with the Courts of Dresden, Vienna, and St Petersburg, which he carried on during the last fifteen years of his life, as the coquetries of personal vanity, would be to give to them a most ill-natured interpretation, and one quite unworthy of Leibniz's philanthropic and cosmopolitan spirit.

The first of these projects was that of forming at Dresden, under the protection of Augustus, King of

Poland, a society similar to and in correspondence with the Berlin Society. Here, again, the plan—for which Leibniz elaborated a complete programme—though approved by the king, fell through on account of the political disturbances caused by the war which Augustus was waging with Charles XII. of Sweden. Nor was he more successful, though more persevering, in Vienna, where he spent a great part of the last years of his life. Through this he incurred the displeasure of his master, George, who succeeded his father, Ernest Augustus—the same who was crowned King of England in 1714. In Vienna Leibniz had gained for his scheme the favour of the Emperor Charles VI. and of many eminent statesmen — especially of the illustrious Prince Eugene of Savoy, whom he addressed in several letters on this subject. Wars, he remarks, had interrupted the brilliant progress which had been made during twenty-four years after the peace of Westphalia; but now, after the renewal of a general peace (1713), time and opportunities seemed to offer — through the foundation of an Imperial Society — to reform the means of education, to promote science, and to stimulate industry and agriculture. Again he supplies a programme and offers his services. But he had to leave Vienna before anything was settled, and in his absence it appears that the intrigues of the Jesuits counteracted his influence. The Academy of Vienna was not founded till 100 years later.

The most eminent of sovereigns with whom Leibniz came in contact—the Czar of Russia, Peter the Great —was more really appreciative than *les deux Electrices*, who both aimed at royal dignity, or than the Emperor

of Germany. Bent upon the education of his people, as well as on the development of the resources of his country, Leibniz thought he had found in him the great man whose support he needed for the promotion of true science. The project of an academy was here actually taken in hand, though neither Leibniz nor Peter the Great lived to see it formally organised.

Of the many projects which he propounded, only the Society of Berlin was in actual existence, though far from flourishing, when Leibniz died in Hanover in 1716 —disappointed in his schemes, and with scarcely a friend at the Court which he had served for nearly forty years.

CHAPTER V.

CONTROVERSIES.

In his threefold character — as mathematician, philosopher, and academician—Leibniz laid the foundations of future progress. His name shines with equal brilliance on the pages of the history of mathematics, of philosophy, and of the academies of Europe. There we find recorded for all times the constructive efforts of his genius. But his work was not all construction and upbuilding; nor was it all successful. To gain a more complete view of his character and work, we must follow him into the elaborate defences with which he surrounded the edifice of his philosophy; into the polemics in which he was entangled; into the personal disputes which sprang out of the invention of the infinitesimal calculus; and into the lengthy arguments which he produced in favour of the union of the Churches, as well as into the favourite projects which remained unsuccessful.

In the third chapter (p. 55) we have given an account of Leibniz's mathematical studies in Paris till the time of his departure for London in the autumn of 1676. It is evident from his manuscripts, which

are preserved in the library of Hanover, that at the end of 1675 and in the beginning of 1676 he had mastered the principles of the new calculus. It is also proved that he heard, through Oldenburg, of Newton's inventions and general methods. In the letter of Oldenburg's, dated 13th July 1676, there is a long extract of a statement of Collins, in which the latter refers to a letter of Newton's of the year 1672, in which the more general methods, which he had invented, were mentioned. Hence there can be no doubt that from Newton's own letter, dated 13th June, as well as from Collins's remarks transmitted through Oldenburg, Leibniz knew that Newton had been for years in possession of general methods of similar value to those which he had invented about nine months previously. It is doubtful whether during his short visit to London in the autumn of 1676, when he first made the personal acquaintance of Collins, he received any further information regarding Newton's invention; for Collins, in a report on his interview with Leibniz, does not mention this. Even allowing, however, that Leibniz had inspected a copy of Newton's letter of 1672—either in Paris or in London—this cannot have taken place till about six months after he had made his invention independently and fixed upon his well-known notation. Nor is it likely that Newton himself, when in October 1676 he composed his celebrated letter, thought that what had been previously communicated to Collins, Oldenburg, and possibly to Leibniz, was sufficient thoroughly to explain and establish the general and novel character of his infinitesimal methods, or he would not have concealed this in his two anagrams. It

would still have remained for Leibniz to penetrate to the root of the question—to conceive the problem in its greatest generality, and to fix upon a notation expressive alike of new conceptions and operations. The communications of Newton would only have added one more to the infinitesimal methods of Barrow, Wallis, and others, which were known to Leibniz. The differential and the integral calculus were, so far as Leibniz knew, not yet independently established. They were still to be invented. It was therefore quite consistent that Leibniz, when in 1677 he replied to Newton's letter of October (which did not reach him till May of that year), should fully explain his independent method—making use of the well-known algorithm of the differential calculus, but not of that of the integral calculus (which in a draft of the letter still preserved is repeatedly introduced)—adding that no doubt Newton's method, which he wished to conceal, did not differ from his. To this letter Newton made no reply, and the correspondence ceased — probably owing to the death of Oldenburg in August 1678. Nothing was heard for several years of the new calculus after the communications between Leibniz and Newton came to an end. In the voluminous correspondence of the former, before the year 1684, reference is made to the new methods—especially in letters to Huygens and Tschirnhaus; but no lengthy expositions and calculations are given, such as the letters to Oldenburg contained. Nor does it appear that Newton took any steps to explain more fully, even to his friends, the nature of the general methods which he possessed. Leibniz was the first to publish and give to the learned world his results. Probably induced by some papers of Tschirn-

haus which appeared in the 'Acta Eruditorum,' and which bordered on the province of the calculus, he sent to the editor of that journal a paper[1] — about July 1684 — in which he gave a short statement of the principal theorems of the differential calculus, together with the new notation. The inverse problem of the integral calculus was only alluded to; the notation of this calculus was not published till 1686.[2] The general opinion of contemporaries was, that these statements were too short and succinct to make the calculus generally understood. Sir Isaac Newton was still more reticent and disinclined to divulge the secret, having made extensive use both of the direct and inverse methods of fluxions in working out the problems of the 'Principia' (published in 1687). He expunged every trace of the new method and of his peculiar notation, demonstrating the problems by the well-known methods of the ancients, and giving only one of the principal rules of the calculus in the second lemma of the second book.[3] Even as late as 1693, when Dr Wallis in the second volume of his works published some extracts from an unpublished manuscript of Newton, it was he and not Newton himself who showed to the world the long-hidden treasure. It is also important to note that, owing to Tschirnhaus's papers, which appeared in the Leipzig Acts, Leibniz himself published his invention probably at an earlier date than he would otherwise have done.

[1] "Nova methodus pro maximis et minimis, itemque tangentibus, quæ nec fractas, nec irrationales quantitates moratur, et singulare pro illis calculi genus."—Acta Eruditorum, 1684.

[2] "De geometria recondita et analysi indivisibilium atque infinitorum."—Acta Eruditorum, 1686.

[3] See Brewster's Life of Newton, vol. ii. p. 16.

The reasons which actuated both Leibniz and Newton in concealing their invention—the one for nine and the other for twenty-seven years—have been the subject of much conjecture, especially so far as the latter was concerned. If, however, we remember that long after the new methods had become a general property, many doubts were expressed as to their rigid correctness both on the Continent and in England; that the calculus was misapplied even by eminent mathematicians; that Lagrange, more than a century later, did not employ the infinitesimal methods till he had by special algebraical investigations satisfied himself of their correctness,—it cannot appear surprising if in the minds of its inventors the differential method was surrounded by what may be called metaphysical scruples, and that upon the correctness of its results, otherwise verifiable, rested to a large extent the reassuring proof of its validity and usefulness. From Leibniz's manuscript notes, it is evident that these metaphysical questions regarding the real meaning of the infinitely small differences occupied his early attention, and that these scruples gradually disappeared as the practical value of the new method became obvious. And if we are correct in the opinion stated above,—that Leibniz cared more for methods, and Newton more for the results which he gained through them—that the former studied more the abstract principles, the latter more the observable *de facto* laws of things,—it follows of necessity that Leibniz, exclusively bent upon establishing new principles, would arrive earlier at a clear insight into the nature of the new calculus, and hence would be ready earlier to publish it in the abstract. From his disposition Leibniz was perhaps less thorough than

Newton was. He was certainly less timid in publishing new theories and opinions, dealing with subjects where absolute proof was impossible. By nature bold and venturesome, his labours were more suggestive than exhaustive. In this he was the very reverse of Newton. And if, as we believe must have been the case, the publication of the new methods was to some extent hazardous, he who made them known first, ran whatever risk there was, by exposing himself to the criticism of opponents. On the other hand, he who only employed them where the results proved correct, and only avowed his authorship when the world had pronounced its verdict, took the safer course, while he ran the risk of being less generally known as the inventor. The rapid progress, also, and development of higher mathematics under the hands of Leibniz and his friends, James and John Bernoulli and the Marquis de l'Hôpital—their voluminous correspondence, replete with discoveries and solutions of the most important problems in geometry and mechanics — the great impetus they gave to these researches all over the Continent,—contrast remarkably with the meagre results which the fluxionary calculus yielded in the hands of Newton's friends. Though known to them from the year 1670, it seemed to be to them a dead letter which they hardly understood, and did certainly not appreciate. Unlike the great Huygens, who, doubtful at the beginning as to the value of the differential calculus, ended by mastering it and recognising its vast superiority over the older methods,[1] Wallis, the author of the 'Arithmetica Infinitorum,' who had

[1] See the correspondence between Leibniz and Huygens in Leibniz's Mathematical Works, vol. ii., especially p. 98 *et seq.*

given one of the strongest impulses to the invention of the new calculus, and who first published Newton's methods, seems never to have become really familiar with them, or to have admitted their great usefulness.[1] These remarks do not refer to Newton himself, for in his hands the calculus led to the most remarkable results; but they substantiate the correctness of the view which Leibniz and his friends took of the position of English mathematicians in relation to the calculus. Not long before his death, Leibniz wrote (see the MS. published by Gerhardt, vol. v. p. 418):—

"The inventor" (meaning himself), "and the very learned men who employed his invention, have published beautiful things which they produced with it; whereas the followers of Mr N." (Newton) "have not effected anything in particular, having hardly done more than copy the others, or wherever they wanted to pursue the matter have tumbled into false conclusions. . . . Hence it can be seen that what Mr N. has found is to be attributed more to his own genius than to the advantage of the invention, and how incapable his followers are to imitate him."

And after the death of Leibniz, Remond de Montmort wrote to Brook Taylor in 1718 as follows:[2]—

"I was much surprised to find what follows in your letter. As to the owning of any one as inventor or improver of the method besides Sir Isaac Newton, I knew of none. I saw nothing anywhere that seemed to me an improvement upon what Sir Isaac had published. I was sensible that several had applied the method with good success, and understood

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[1] See correspondence between Wallis and Leibniz in Leibniz's Mathematical Works, vol. iv. pp. 50, 57, &c.

[2] See Brewster's Life of Newton, vol. ii. p. 573, &c.

pretty much of it; but I always took Sir Isaac Newton not only for the inventor, but also for the greatest master of it. I think like you, sir, regarding the merit of Mr Newton. I always speak of him as of a man above the others, and whom one cannot sufficiently admire. But I cannot refrain from combating the opinion which you hold, that the public had received from Mr Newton, and not from Messrs Leibniz and Bernoulli, the new calculus, and the art of making it serve all the researches which can be made in geometry. This is an error of fact. It will be better if I, who have on this point no prejudice, nor any reason for having any, who profess to be your friend, and am so certainly more than the German geometricians, whom I have never seen,—I say it will be better if I make you perceive the error rather than an adversary, whom you would give an advantage over you, and who would, with semblance of truth, reproach you that your zeal for the glory of your nation makes you partial, and makes you forget all the rules of equity. I shall not now examine the rights which Messrs Newton and Leibniz have on the first invention of the differential and integral calculus. I will, when you desire it, tell you in detail the reflections which a long and serious examination have suggested, and I hope that you will not be dissatisfied with them. I only want to make you perceive that it is untenable to say that Messrs Leibniz and Bernoulli are not the true and almost sole promoters of the calculus." (Here follows an enumeration of the application of the calculus due to Leibniz and Bernoulli.) . . . "No one except the Marquis de l'Hôpital, whose name one might add to theirs, although he was a pupil of Mr John Bernoulli, has appeared with them on the scene till about the year 1700. . . . It is true that the 'Principia Mathem.' of Mr Newton appeared in 1686. This profound work could give rise to the belief that Mr Newton knew then about the calculus all that we know to-day, including Mr Bernoulli. I will not deny that this is a separate question. But it is at least certain that that book teaches nothing of the calculus, except it be the 2d lemma, page 250, first edition; but you know that it only contains the first and most elementary rule

of taking the differences, which Mr Leibniz had done at greater length in 1684. I may add that in the second volume of Mr Wallis, printed in 1693, one finds at greater length the rules of the calculus; but although this specimen suffices to give us a great idea of what Mr Newton then knew, it does not teach anything that cannot be found in the journals of Leipzig. You find in 1697 a solution by Mr Newton of the problem of quickest descent; but as there is no analysis, and one does not know the road which was followed, this does not touch my proposition, which is, that since 1684, the first public date of the birth of the differential and the integral calculus, till 1700 or thereabout, when I suppose it had attained nearly all the perfection which it has to-day, nobody has contributed to perfect it besides Messrs Leibniz and Bernoulli, except one wishes to add to some extent the Marquis de l'Hôpital, to whom they had early revealed their secrets. And such they would have remained for all the geometricians of to-day, if they had chosen to hide them as Mr Newton did, who, in my view, must have had the key to them and similar ones ever since he produced his celebrated work, 'Ph. Nat. Ppia. Math.' Nothing more beautiful or better in its way could be had than Mr Newton's treatise, 'De quadratura curvarum'; but it came too late. The date of printing of this work is fatal,—not for Mr Newton, who has gained more renown than the most ambitious might desire, but for some Englishmen who seem to bear a grudge against those who have first discovered and published these new methods, which have carried geometry so far."

We have given our opinion on this celebrated controversy in the words of an eminent contemporary of Leibniz, because the researches of 160 years have done nothing to destroy the fairness of his statement.

It may not be uninteresting to remark that a relation similar to that which existed between the illustrious inventors of the infinitesimal calculus again occurred on

the occasion of the establishing of the theory of elliptic integrals at the beginning of the present century. To this important invention Gauss held the same position as Newton did to the calculus, while the labours of Legendre, Jacobi, and Abel corresponded to those of Leibniz and Bernoulli.[1] And to illustrate the position of these inventors by facts and names more familiar to the general reader of the present day, we may refer to the invention of the incandescent electric lamp by Swan in England, and Edison in America, in which case the earlier and more exhaustive experiments of the former were forestalled by the later but more speedily and hastily published inventions of the latter.[2]

Our statement of the facts of the invention of the calculus, and the respective merits of the great men who are associated with it, should make it superfluous to enter into the personal disputes which extended over the last decades of Leibniz's life, and in which he himself took so prominent a part. As regards Newton, it was usually only his friends who took part in these controversies. The spirit, however, displayed in these disputes waxed so angry, and was so little creditable to all who were engaged in them, that we are bound to examine in how far they throw a light on Leibniz's character. The facts are perhaps better known in England than anything else referring to this great man, filling, as they do, many pages in a popular biography of the greatest scientific

[1] See on this subject the correspondence of Legendre and Jacobi in 'Crelle's Journal,' vol. lxxx. ; also the notes to the third vol. of Gauss's complete works, edited by the Gottingen Society, and a succinct account in Professor Williamson's article on the "Infinitesimal Calculus" in the 'Encyclop. Brit.,' vol. xiii. p. 62, &c.

[2] See the account in Dredge, "Electric Lighting."

genius which England has produced.[1] They are not the least of several causes which have in this country impeded the recognition of Leibniz's claims as one of the greatest mathematicians and philosophers. Nor can it be denied, that—after having been repeatedly attacked, not by Sir Isaac himself, but by those who professed to be his friends, but who themselves were partial, prejudiced, and frequently incompetent to form an opinion—Leibniz in fighting the battle felt himself outnumbered, and stooped to means which were unworthy of his genius or of the just cause he was defending. It must not be forgotten, however, that had Sir Isaac Newton replied to Leibniz's letter of the year 1677 in the same direct manner in which it was written, the question of the relative merits of the two inventors could have easily been settled; whereas, by waiting for wellnigh thirty years, and allowing his friends to take up his case, he placed his rival at a disadvantage, for which he was not prepared. Leibniz occupied no position which commanded influence or power; he had no favour to bestow; he was not supported, as Sir Isaac was, by an eminent scientific body like the Royal Society, nor by the pride of a nation, ready to vindicate the claims of her most eminent son; he was tortured by rheumatic suffering, disappointed by the failure of many of his favourite schemes, molested by the demands of a prince who recognised in him only the historian of his dynasty, removed from those who had for him the admiration he deserved, solitary in his thoughts and in his labours. Looking out for help, he found no one except his fellow-worker, John Bernoulli, who promised only an anony-

[1] See Brewster's Life of Newton, vol. ii. chap. 15.

mous support, and the 'Leipzig Acts,' the organ of his eminent publications. Availing himself of the scanty assistance afforded by them, and deprived of personal and verbal intercourse, he manipulated his evidence in the fly-leafs and declarations which he published with a diplomacy, creditable, perhaps, in the counsellor of princes, who had to wind their way through the maze of European politics, or to evade the enemy rather than face him, but certainly damaging to the reputation of a great philosopher, and insulting alike to his friends and his adversaries. The apparent duplicity of Newton's celebrated anagrams, of his continued silence, of the scholium in the first edition, and the changes introduced in the later editions of the 'Principia,' has been attributed by his biographers to his dislike of controversy, and his desire to live at peace with every one. We will not attempt a vindication of Leibniz's more doubtful conduct. Allowing for the extenuating circumstances in which he was placed, and the provocations to which he was exposed, we must still recognise in it a remarkable moral defect in a towering intellect.

The controversy between Leibniz and Newton was not limited, however, to the discovery of the calculus; it extended beyond this personal question into the field of philosophical inquiry, and it influenced prejudicially the recognition of Newton's greatness on the Continent, as it did that of Leibniz in England. Newton's greatest work, the 'Principia,' appeared in 1686. In 1689 Leibniz became acquainted with it through an abstract of it which appeared in the 'Acta Eruditorum' in 1689, and which reached him in Italy, where he was then travelling. It was unfortunate that the result of Newton's in-

vestigations should have come to Leibniz in the form of an abstract, which did not reveal the true value of the work. Even independently of this, it is doubtful whether Leibniz—though he could understand—could really appreciate a treatise which, confined purely within the limits of the mechanical philosophy, professed to deal only with facts (the laws of Kepler), and the relations which could be inferred from them by rigid calculation (the law of gravitation), but which renounced all attempt to give the hidden causes or the reason of the simple relations to which it had reduced the apparently complicated phenomena. That Newton did not look upon the propositions in the 'Principia' as an explanation of natural events is clear from what he said himself, especially in his letters to Bentley, whom he assisted in the composition of his 'Boyle Lectures' in illustration of the evidences of Christianity. There existed in the mind of Newton a satisfactory reason for the constitution of the universe, as it was expounded in his great work; and he confesses that, when he wrote the third book, he had an eye upon such principles as might work for the belief of a Deity. The position which Newton held,—his firm belief in an overruling power on the one side, and on the other the confidence that the observation of facts, and the reducing of them by means of mathematical calculation to simple relations or laws, could not but harmonise with that belief,—was not an attitude which satisfied Leibniz or any of the Continental thinkers. For the works of some contemporary writers had shaken religious beliefs, and the prolonged and undecided contest of the Churches had introduced an element of fundamental uncertainty. The object

of philosophy was to gain certainty, and — not contented with mere facts—to dive beyond them into the sphere of the ultimate reasons and causes of things, and of the principle which governed them. By such means Leibniz hoped to re-establish the lost faith, and to "vindicate the ways of God to man."

It is probable, therefore, that Leibniz looked upon the 'Principia' as an attempt similar to that which had occupied him for fifteen years, and which had led him about this time to a satisfactory philosophical conception, —a conception by means of which he was enabled not so much to calculate and summarise natural phenomena, as to understand them and see their meaning and deeper cause. Finding this awanting in Newton's work, and unconscious as well as unappreciative of the modesty and reserve which made that great man halt at the threshold of the conjectural, he at once composed (and subsequently published in the 'Acta') a fragment, designed to indicate how the wanting explanation could be supplied.[1] We have seen him busy in a similar undertaking nearly twenty years before, when he presented his two juvenile treatises to the Royal Society and the French Academy. In the essay of the year 1689 he introduces the Cartesian idea of vortices to explain the phenomena of gravitation, of magnetism, and others.

The value of these speculations, as compared with the work of Newton, is small; still they represent one of the many attempts which have been frequently repeated of assigning some definite cause for the action of bodies at a distance; nor is it at all likely that either science

[1] See his "Tentamen de motuum cœlestium causis." — Acta Erudit., 1689.

or philosophy will desist from trying anew to trace the laws of attraction and repulsion to some more general principle. But the interests which guide them are not the same; they are as little the same now as they were then, it is only that we at present are able to define the difference more clearly.

This difference between the scientific and the philosophical interests lay at the foundation of the controversy which Leibniz carried on in later years with Dr Samuel Clarke. Leibniz had repeatedly, in his correspondence with Huygens, the Abbé Conti, and others, urged his objections to Newton's theory of gravitation, which he stated to be that gravitation is an original property of matter. He compared it with the occult qualities of the schoolmen, and complained that it gave no explanation of phenomena. In his great work, the 'Théodicée,' published in the French language in 1710, he first publicly made known his objections; but in a letter to the Princess of Wales,[1] dated November 1715, under the influence of the many attacks and irritations to which he had been subjected, he gave to his objections the appearance of a personal invective. The princess, who, during her lengthened residence at the Court of Berlin, knew and admired Leibniz, was desirous to receive explanations from the other side, and it was arranged that Dr Clarke should reply to the philosophical objections advanced by Leibniz against Newton's system. The controversy was carried on in five letters and replies, and was interrupted

[1] The Princess Wilhelmina Charlotte of Ansbach. She had renounced her early prospects of being the bride of Charles IV. of Spain (Charles VI. as emperor) on account of her strong Protestant convictions.

by Leibniz's death in 1716. But it was sufficiently elaborate to show the radical differences of the two views. Clarke found himself obliged to defend the theories of Newton against the obvious conclusions which might be drawn from them regarding the creation and government of the universe, if the fact of universal attraction were considered to be the final statement of the philosopher. But this it was not. Many ideas and explanations might be interpolated between the two facts which stood firm in Newton's mind,—the fact of universal attraction and the fact of a Divine Ruler. Clarke's explanations can merely be considered as a variety of suggestions how these two facts might be logically linked together without mutual damage or interference. Leibniz had early learned that the difficulties cannot be got over in this tentative manner; but that the ordinary conceptions of interaction, of substance and force, and of the relation of the Creator to the created, must be remodelled. He had long ago arrived at the peculiar conceptions of the monad and of the pre-established harmony, and from these as central ideas he criticised the arguments of Clarke, exposing their inconsistencies and fallacies. He could rightly say to John Bernoulli that such discussions were play to him: "Quia in philosophia omnia percepi atque animo mecum ante peregi." But it was equally natural that Clarke, who did not grasp the central idea of Leibniz's system, should look upon his explanations as far-fetched and artificial. This system had been known to Continental philosophers for more than twenty years, and the principal objections against it had been many times stated and answered by Leibniz himself. It is, however, unlikely that Clarke

was acquainted with them, or that he appreciated either the logical reasons or the practical ends for which the system had been elaborated. Leibniz had many a time before gone over the same ground. The plea which he—not without some personal acrimony—had brought against the mechanical philosophy of Newton, — viz., that it might lead to an irreligious view of the universe,—had been advanced thirty years previously against the philosophy of Descartes.[1] The development of opinions during two hundred years has proved that Leibniz was right. The system of interpolation and compromise, such as that attempted by Clarke, has become impossible. The world of mechanical laws, further extended, has left no room for the world of final causes, living in the governing mind of a Deity; and the only way out of the embarrassment is to resort to some process of remodelling the notions, which are supplied by common-sense and adopted by science, in a similar way as Leibniz had attempted to do. Of this we shall have to say more in another place. We have now only to supplement our sketch of Leibniz's controversy with Newton, which extended over a period of forty years, by a reference to the shorter but not less important polemics with Pierre Bayle. They belong to the earlier years of Leibniz's philosophical fame, and were carried on in a spirit not of antagonism, but of great mutual admiration.

Pierre Bayle (born in 1647), a native of the south of France, was a contemporary of Leibniz; but he died ten years before him (in 1706). He had, as professor in Rotterdam—almost contemporarily with the first appearance of the 'Leipzig Acts'—published in Am-

[1] See p. 70.

sterdam a literary journal, under the title of 'Nouvelles de la République des Lettres'; and Leibniz had, in the year 1687, published in this journal a letter, in which he gave one of the earliest specimens of his new philosophical reasoning.[1] When Bayle, in the year 1697, brought out his celebrated work, the 'Dictionnaire Historique et Critique,' he took the opportunity,—in giving an account of Hieronymus Rorarius's book on the reason in animals (Amsterdam, 1654),—of making some critical remarks on the new theory of Leibniz, whom, as elsewhere,[2] he treats with the greatest respect and admiration. Whilst confessing his inability to agree fully with Leibniz in the manner in which he explains the connection of mind and body by the theory which the Père Lami, in his 'Traité de la connaissance de soi-même' (1699), had termed the "voie d'harmonie préétablie," he admits its advance on the ideas current in the schools and on the occasionalistic theory of Descartes, and he hopes that his remarks will stimulate the author further to explain his views. He concludes by saying—

"M. Leibniz, with the penetration of his great genius, has grasped very well the whole extent and the whole force of the objections, and where the source of the remedy for the principal difficulty lies. I am persuaded that he will smooth down all that is most rugged in his system, and that he will teach us excellent things about the nature of mind.

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[1] Leibniz had subsequently published in the 'Journal des Savans' (1695) an essay entitled, "Système nouveau de la Nature," and had followed it up, in reply to Foucher, by three *éclaircissemens* in the following year.

[2] See 'Dict. Hist. et Critique,' art. "Pelisson," where Bayle says of Leibniz: "Il est de ces hommes rares qui ne trouvent point de bornes dans la sphere du mérite humain: il la remplissent toute."

No one can travel more safely and more usefully than he, in the intellectual world. I hope that his beautiful explanations will dispel all the impossibilities which yet remain in my mind, and that he will effectually solve my difficulties, as well as those of Dom. François Lami; and it is with this hope that I can say without compliment, that his system must be considered as an important achievement."

But as afterwards, in his opposition to Sir Isaac Newton's system, so also in his controversy with Pierre Bayle, Leibniz was led, not merely by personal, but by higher and more practical motives. Bayle was a literary sceptic: the study of all the important systems and the knowledge of contradictory theories, displayed in the composition of his great work, had made his mind versatile and critical in the extreme, and had nursed in it the opinion that no certainty could be attained in knowledge, and that there existed an inevitable antagonism between reason and faith. The blind subjugation of reason to faith was proposed as the only solution of this dilemma; and not without some irony this was termed "the triumph of faith." It was, as we have mentioned above, one of the earliest and favourite ideas of Leibniz that such antagonisms are not founded in the nature of things, the essence of which is harmony and order. Early in life he had endeavoured to prove the reasonableness of religious doctrine. In 1671 he had, at the Baron Boineburg's request, composed and circulated an essay on the problem of free-will and predestination; and in 1697, in a letter to Magliabechi, he uses the word "Théodicée" as the title of an intended work. The plan was not carried out till many years later. The writings of Bayle had made a profound sen-

sation all over the continent of Europe: the doctrine of the unreasonableness of religious truth, and the delicate irony which accompanied many of his utterances on religious subjects, did more to undermine belief in the minds of his readers than more direct attacks could have done. An age steeped in philosophic reasoning, and full of admiration for the new philosophy of Descartes and for the discoveries of natural science, was not likely to return to the view of Tertullian, whose *credo quia absurdum* belonged rather to the early centuries, when philosophy was old and worn out, while faith was new and vigorous. The recommendation of Bayle to subordinate reason to faith passed unnoticed, and the only hope lay in the attempt to show that faith might transcend but could not contradict reason: it lay in establishing an agreement, not a truce, between religion and philosophy.

In none of the polite circles of Europe were these subjects more discussed than at the Courts of Hanover and Berlin, where *les deux Electrices*, Sophia and her daughter Sophia Charlotte, afterwards Queen of Prussia, formed the centre of literary and scientific interests. The works of Bayle and of Locke were there read and discussed, verbally and by letters. The recently published correspondence of Leibniz with these two illustrious women, and with other persons of importance, who either visited them or stood in connection with them, proves how eagerly such subjects were investigated. These conversations and discussions came to an end soon after the death of the Queen of Prussia in 1705, and with it much of the small share of real happiness which was vouchsafed to Leibniz in his court life; but the

substance of his discussions and conversations has been perpetuated in the two most important of his works which we possess. Only one of these, the 'Théodicée,' appeared during Leibniz's lifetime—viz., in 1710. It was written in answer to Bayle's writings, and its first chapter treats of the conformity of faith with reason. The other work, the 'Nouveaux essais sur l'entendement humain,' was not published during his lifetime; his reason for leaving it unpublished being the death of Locke, against whom it was directed. It was published by Raspe in 1766.

A knowledge of these polemics, and of the just and urbane spirit in which they were conducted, is necessary, in order to judge Leibniz correctly in the controversy which he carried on with Dr Clarke. The subject was old and familiar to Leibniz; it was new to his last and least friendly opponent. What Leibniz knew of Englishmen did not incline him favourably towards them, in comparison with the great Continental thinkers, with Malebranche, Huygens, Arnaud, Bayle, and Remond de Montmort, with whom he carried on a lengthy correspondence, and who entered appreciatively into his ideas, whether they embraced them or not. Locke took no notice of the 'Reflexions,' which he addressed to him in 1696. Newton had no reply to his celebrated letter of 1677. Besides these personal slights, Leibniz had reason to deplore the result of the mechanical and realistic philosophy in England, such as it disclosed itself in the teachings of the celebrated deist John Toland, one of the many Englishmen who accompanied the Earl of Macclesfield on his mission to Hanover in the interest of the succession. It is thus clear how

Leibniz gained the impression, which he communicated to the Princess of Wales, that the cause of irreligion was making progress in England; and how, in writing to John Bernoulli, he was justified in referring to the controversy with Clarke in the words quoted by Brewster, that such discussions were for him

> "Ludus et jocus, quia in philosophia
> Omnia percepi atque animo mecum ante peregi."

CHAPTER VI.

UNSUCCESSFUL ATTEMPTS AND NEW BEGINNINGS. —THE CHARACTER OF LEIBNIZ.

The invention of the new calculus, the foundation of a novel system of philosophy, the composition of political pamphlets, and of the annals of an ancient dynasty, the promotion of learned academies, the controversies and correspondence connected with these manifold pursuits, —give us only a very imperfect idea of the work which filled the last forty years of Leibniz's life. From the central position which they mark we have to follow the philosopher into two opposite courses, which have, as it might at first sight seem, nothing in common, but which were, nevertheless, firmly connected with each other in the mind of their author. We have already had occasion to note how two equally powerful interests governed the studies of Leibniz: the desire to penetrate, on the one side, to the very root and origin of existing ideas; and, on the other, to apply them to practical ends. Both of these had a feature in common: the descent into greater depths of thought ought to reveal unity and harmony, and give simplicity of method and definiteness of search; while practical work ought to reconcile exist-

ing differences and causes of conflict. Two favourite schemes of his, in a still greater degree than anything we have seen so far, mark these peculiarities of Leibniz's mind; neither of them succeeded, but they have become deservedly celebrated. They claim our attention, not so much because they belong to the famous failures of genius, as from the insight they afford into the workings of his mind. The first was the formation of a "general Characteristic," the other the attempt towards a reconciliation of the two Churches.

The plan of a general language of signs, of a "lingua Characteristica universalis," of an alphabet of human ideas, of a "calculus philosophicus," or "calculus ratiocinator," of a "spécieuse générale,"—was not a novel one. Ever since the introduction of letters, instead of numbers, in algebra, the idea had occupied philosophers and inventors of applying signs to science and knowledge in general, thus making logical deductions and definitions clearer, more generally accessible, and more definite. Raymond Lully or Lullius, an Italian, had in the thirteenth century, invented a contrivance, by which different logical notions could mechanically be brought into combination. Leibniz was acquainted with this so-called Lullian art, and in his dissertation 'De Arte combinatoria'—written when he was twenty-one—he prefixes a diagram, containing, in a circle, an arrangement of different notions, according to their logical characters. The fathers of modern philosophy, Bacon and Descartes, both aimed at inventing a general and certain method of research, which should either lead to discoveries of truth with mechanical certainty, or be universally applicable, in spite of the differences of language. But besides

these general anticipations,[1] Leibniz was forestalled more fully and minutely in the works of two writers of this country—first by George Dalgarno of Old Aberdeen, who published in 1661 in London a book, entitled 'Ars signorum vulgo character universalis et lingua philosophica' (London, 1661); and secondly by Bishop Wilkins, who published in 1668 'An Essay toward a Real Character and a Philosophical Language.' When Leibniz was in London, on his first or second visit, he communicated his ideas to Robert Boyle and Henry Oldenburg, who encouraged him to put them in writing. Boyle was acquainted with Wilkins's scheme. Leibniz, however, intended to go further than these English writers, for he meant to unite the method of combinations with the plan of general characters or signs. He said to Placcius that his scheme would have to be realised "characteribus et calculo."[2] References to his labours in this direction are to be found throughout his extensive correspondence, and several fragments on the subject have been edited by Erdmann in the philosophical works,[3] and by Gerhardt in the mathematical ones.[4] Some who have carefully studied these, as well as the many unedited fragments which are preserved in the library in Hanover,[5]

[1] The practical object of the "spécieuse générale" can be seen from the title of one of the many fragments which Leibniz left, and which was published by Erdmann,—see No. xii. of his edition: "Initia scientiæ generalis de nova ratione instaurationis et augmentationis scientiarum, ita ut exiguo tempore et negotio, si modo velint homines, magne præstari possint ad felicitatis humanæ incrementum."

[2] See Dutens, opp. iii. 34.

[3] See Erdmann, Nos. ii., vii., xi. to xxi.

[4] See Gerhardt, Math. Works, vols. v. and vii.

[5] See especially the article by A. Trendelenburg in the 3d vol. of his Historische Beiträge zur Philosophie, Berlin, 1867.

tell us that little was done by Leibniz in the way of carrying out this favourite idea. An extensive preparatory piece of work was performed by a young scholar—Johann Friedrich Hodann, a poor candidate of theology —who, encouraged by Leibniz, collected explanations of synonymous words, following the order given by Dalgarno, and the definitions of the best existing Latin dictionaries,—such as those of Matthias Martinius, Micraelius, and Ausonius Popma.

The invention of the calculus, and the surprising usefulness of the new algorithms, must have confirmed their author's belief in the value of definitions, if accompanied by signs; and as in the process of finding the new mathematical methods analysis led the way to the first elements, out of which geometrical quantities could be conceived to be made up, so it was evidently a parallel process by which the general "characteristic" was to be established. Leibniz himself, in writing to Remond de Montmort, compares the plan of the "spécieuse générale" with the calculus, remarking that the practical applications of the latter had made it acceptable, whereas his mathematical friends had treated as visionary the other and more comprehensive scheme.[1]

It is hardly necessary to state that this scheme was never carried out. Before, however, condemning it wholesale, it is well to bear in mind the following facts.

Many critics of Leibniz have repudiated the plan of a general "characteristic" or method of search and invention as chimerical, because the inventive faculty of the mind is a gift of genius, not to be taught or learned. This rests on a misconception of the idea

[1] See Letter to R. de M., Erdmann, p. 703.

of Leibniz. He did not intend to force human knowledge and wisdom into merely logical forms: he only maintained that a large portion of such knowledge would be benefited by more general and more rigorous methods —that the process of analysis, and the strict definition and combination of elementary notions, would work wonders. But he admits, in harmony with his philosophical opinions—of which we shall have to speak hereafter—that much in the human mind is indistinct and indefinite, and that all truths are not necessary (to the human mind), but that many of them are accidental and casual. These truths and ideas have their roots in the ultimate constitution of things—or, as we may say, in conformity with Leibniz's views, in the mind of the Creator, who views things as they are. These truths are like the incommensurable quantities in arithmetic, they require an infinite analysis. In this respect the perfect knowledge of any single thing (*i.e.*, of the *veritates facti*)[1] postulates the knowledge of everything else, and is therefore not attainable by any mechanical or general process of thought.[2] But the progress of mathematics has shown that the imperfection of our knowledge regarding any single fact, such as any given sphere, does not prevent us from having correct and useful theorems about the sphere in general or in the abstract; and the success of the calculus proves that even the difficulties of infinitely small quantities and of the continuous can be overcome. We must, moreover, agree with Leibniz, that the progress of science depends upon the degree in which we succeed in reducing phenomena to calculable combinations of

[1] Erdmann, p. 83.
[2] See Gerhardt, Philos. Schriften, vol. ii. p. 39.

measurable elements. Such has, since his time, been the case with all the different phenomena of physical forces. In reducing them to modes of motion, they have been submitted to the methods of analysis. In chemistry, likewise, an exact treatment, or, as Sir H. Davy termed it, "a sound logic," commenced with the explosion of the vague phlogiston theory, and with the doctrine of atomic weights, by which the qualitative differences of the elements have been reduced to quantitative differences. Nor is it possible to say where this process will end. Every day adds a new instance to the many existing applications of signs and numbers, and extends the use of characters, and though it is not likely that a universal method will be established, the reasons are not those which have been usually put forward by the critics of Leibniz. The difficulties lie in a different direction. The first step in the exact treatment of natural phenomena or of events is to form a conception of how an apparent dissimilarity can be reduced to a quantitative difference: it is the formation of what Gauss[1] termed "eine construirbare Vorstellung," and Clerk Maxwell translated as a "mental representation."[2] Now it is the work of the inventive genius to form these mental representations, or to venture hypotheses, which are the basis of calculation and measurement. The use, therefore, of any general method is not likely to kill genius, but rather presupposes it and requires its aid.

Moreover, as this exact treatment touches only one particular side of phenomena, but does not deal with

[1] See Gauss, Werke, vol. v. p. 629.

[2] See C. Maxwell, Electricity and Magnetism, vol. ii., last chapter.

the essence of things, which is incommensurable, the analytical process does not make other processes unnecessary, nor is it bound to start from only one point, or proceed only on a single path. The ways in which we can look at things are manifold. Nobody was more alive to this than Leibniz himself, and the wisdom of much he has said in this direction is only now being appreciated. The same spirit which prompted him to recommend a general "characteristic," led him to see the usefulness as well as the one-sidedness of any special application of the exact or mathematical methods. To illustrate this, we will single out two of his numerous suggestions, which have—long after his age—become fruitful.

The introduction of signs instead of figures had made mathematical formulæ more general; but it occurred to Leibniz earlier perhaps than to any other mathematician, that the fact that general signs did not form a naturally consecutive series of members, such as numbers do, made it more difficult to recognise —in complicated algebraical formulæ—the places, which originally belonged to the different elements; and he soon found that order and symmetry in complicated formulæ were essential, if they were to be readily understood. Especially in the doctrine of the combinations of many elements and of their possible permutations, it is important not only to retain a record of the original plan, but also a certain regularity and order in the changes of each element. This prevents confusion, and expedites operations. Elegant tactics are required in algebraical movements as well as in those of large masses of troops. We see in these remarks an application of the idea of the

general "characteristic." It appears that as early as 1678 Leibniz had again introduced figures in place of letters, using them in the manner that indices are used now, and he strove to arrive at symmetrical arrangements in his calculations. Out of this arose the first use of what are now known as Determinants, and the discovery of the fundamental rule referring to them. Cramer, probably without knowing of the suggestion contained in Leibniz's letter to the Marquis de l'Hôpital of the year 1693, was the first to publish, in 1750, the elements of the theory of Determinants, the name by which they afterwards became known.[1] In fact Leibniz's mathematical discoveries lay in the direction in which all modern progress in the science lies, in establishing order, symmetry, and harmony, *i.e.*, comprehensiveness and perspicuity,—rather than in dealing with single problems, in the solution of which his followers soon attained to greater dexterity than himself. In the application of algebra to geometry—in analytical geometry—Leibniz likewise saw the one-sidedness of the new methods. He saw that through them the science of geometry had been reduced to that of the magnitudes of figures in space: the other—more purely geometrical—relations of position, including similarity and motion of figures, which were equally considered in the ancient Euclidian geometry, had been left out of sight[2] in the algebraic geom-

[1] See Leibniz's Mathem. Works, ed. Gerhardt, vol. ii. p. 238 *et seq.*, and vol. vii. p. 4 *et seq.*

[2] Mathem. Works, vol. vii. p. 362: "It is certain that algebra, as it reduces everything from position to mere magnitude, very frequently complicates things very much." Also vol. ii. p. 19: "Je crois qu'il nous faut encore une autre analyse proprement geometrique ou lineaire, qui nous exprime directement *situm*, comme l'algèbre exprime *magnitudinem*."

etry. He therefore proposed to give a "geometria" or "analysis situs," and his letters to his mathematical friends are as full of this project as they are of the general "characteristic." A collection of the fragments referring to this subject will be found in the fifth volume of Gerhardt's edition of Leibniz's Mathematical Works. The only fragment published during his lifetime was in a letter to Huygens — Sept. 8, 1679 —. in which he encloses an essay as an example of his new geometrical analysis. Huygens failed, however, to understand the object and use of the new analysis, and discouraged Leibniz. The latter, as in many other similar cases, dropped the subject in his correspondence with Huygens, saying to himself, *Non habet hujus rei ansas*—he could not get hold of this thing. Indeed it was not till nearly two centuries later that Grassmann, in his 'Ausdehnungslehre,' further developed the project of Leibniz, who, undaunted by the criticisms of others, entered into a variety of preliminary studies on the subject. Among these are his efforts to define clearly the elements of geometric conception,—definitions which nowadays, when Staudt, Chasles, Steiner, Grassmann, and, in other directions, Riemann and Helmholtz, have given a novel impulse to geometrical research, are adopted as the foundations of what has become an independent branch of science.[1]

Viewing the plan of the general "characteristic" in the light of subsequent inventions, and seeing that not only the infinitesmal calculus and the use of determinants can be traced in the mind of Leibniz to the same source, but

[1] See Professor Ball's article on "Measurement" in vol. xv. of the 'Encyclopædia Britannica.'

that also the "analysis situs"—the loss of which Buffon lamented, although Kant ridiculed it—has since been developed on the lines suggested by Leibniz, we hesitate in pronouncing a decided verdict against it. As we are now in many ways better able to understand the schemes and principles of Leibniz's scientific culture, so it may be that in a future age some approach may yet be made to a realisation of this favourite idea of the philosopher.

We have followed Leibniz into the most abstract and seemingly unpractical efforts of his lifelong meditation. We must now complete our review by casting a glance at one of his favourite practical schemes.

The fact already alluded to, that the peace of Westphalia, which terminated the religious wars of more than a century, effected a compromise between the Roman Catholic and the Protestant creeds in Germany, that the central power of the Emperor was broken, and that it was left to the individual rulers of the many half-independent German states to organise state churches in conformity with their own opinions, gave rise to a series of discussions and changes (the natural result of every conflict), which have not been brought to a distinct issue. The Roman Catholics still hoped to win over many a lost member — if not by force, by the powers of argument — and occupied themselves with proselytising efforts, directed especially to persons of prominent political or literary position, to princes, statesmen, and eminent men of letters.[1] We have already come across two illustrious examples in the persons of the Baron Boineburg and the Duke of Brunswick

[1] A long list of names is given by Biedermann in his valuable work, Deutschland im 18 Jahrhundert, vol. ii. chap. 6.

Lüneberg, both patrons of Leibniz. Leibniz himself came from a Protestant stock, and remained a member of the Protestant Church till the end of his life. His intimacy, however, with such distinguished Catholics as Boineburg, Schönborn, and in Paris with Arnaud and others, drew upon him the displeasure of his Protestant relations, and exposed him to the solicitations of those who wished to gain for their Church so illustrious a convert. An example of the former we find in the letters which Leibniz received from his brother at Leipzig during his sojourn in Paris in the years 1673 and 1674, wherein the latter hints at his faithlessness to his country and his religion. But Leibniz repudiates this charge with dignified firmness, and indeed much of the misunderstanding must have arisen from the fact that many of his letters had not been received by his relatives. Of more importance was another correspondence, that with the Prince Ernest of Hessen-Rheinfels, and through him with Arnaud, in which a direct attempt was made to bring about Leibniz's conversion. The prince, a man of literary tastes and much refinement, had devoted himself after the close of the Thirty Years' War, in which he had fought as a cavalry officer, to historical and theological studies. The great topic of the day—the causes of the schism between the Churches—attracted his attention, and the honest conviction that the truth lay on the Catholic side resulted in his embracing that faith in the year 1652, when he was twenty-nine years of age. After that he continued active in the cause of his Church, and published a pamphlet entitled the 'Discreet Catholic,' in which he tried to promote the return of Protestants to the Roman Church, and also the

remedy of corruptions in the latter. The pamphlet was privately circulated, and a copy was sent to the Duke of Hanover, who had himself become a Catholic in 1651. On the death of the duke in 1680 Prince Ernest desired this copy to be returned to him; and this circumstance led to a correspondence with Leibniz, which extended till the year 1693, when the prince died. How anxiously he desired to bring about the conversion of Leibniz is evident from the correspondence, as also from the fact that he composed a special essay—called an "Alarum"—for Leibniz,[1] with the view of rousing in him the sense of his duty to take the right step. Leibniz was indeed suspected at that time of having secretly joined the Church;[2] and the Archbishop of Cologne had gone so far as to offer him the position of chancellor at Hildesheim, which, however, he declined.

From the explanations which Leibniz gave, it was evident that he approved of the Roman Catholic Church as a political and social institution, and that he desired to belong to a universal church; but that he held certain philosophical views which, though not opposed to the doctrine of the original Christian Church, were contrary to the current theology of Rome. Had he been born in the Roman Church, he would not have voluntarily left it, but would have risked his excommunication, if, on the publication of his views, they had been pronounced to be heretical. But to join the Church now, with a reserve in his heart, would have either forced silence upon him, or exposed him to the

[1] The title is, 'Sviglierino al mio tanto carissimo quanto capacissimo Signore Leibniz.

[2] For instance, by J. J. Spener, the Pietist.

"*Turpius ejicitur, quam non admittitur hospes.*"[1] These remarks of Leibniz were communicated to the celebrated Antoine Arnaud, whose acquaintance Leibniz had made in Paris, and with whom he shortly afterwards entered into a philosophical correspondence. Arnaud added his entreaties to those of his friend the prince, but Leibniz remained immovable, maintaining that he belonged spiritually to the unseen Catholic community, but that he would lose his peace of mind if he were to join the existing Church. We agree with the prince and Arnaud that this position was untenable from a practical point of view, but withhold a final verdict until we sum up our opinion of Leibniz's character.

The views, however, which Leibniz held, both with regard to politics and to religious questions, fitted him peculiarly to be an instrument in the many attempts, in which that age abounded, to heal the great schism, and to bring about a union of the Protestant and Roman Catholic Churches. Accordingly we find him for many years of his life engaged in arguments and negotiations with political rulers and Church dignitaries on both sides. M. Foucher de Careil, in his edition of Leibniz's works, has published a summary of these negotiations, which he found in Leibniz's handwriting. They extend from 1661 to 1693. The author of this summary was not Leibniz, but the celebrated Franciscan, Roxas de Spinola, the father confessor of the Empress, who at the request of the Emperor, made a tour in 1675 through Germany, with a view of persuading the Protestant princes and clergy to listen to the conciliatory proposals of Rome. It does not appear as if he had met with much

[1] See Guhrauer, vol. i. p. 342 *et seq.*

success. Neither the Lutherans in Saxony, nor the Reformed clergy of Brandenburg, nor Spener, the head of the Pietists, believed in the commission of which Spinola was the bearer. In Hanover a variety of circumstances combined to secure for him a better reception; and though the Duke John Frederick, himself a convert, hesitated to expose himself to the suspicions of his subjects by entering into overt negotiations with Rome, his Protestant successor had his own purposes to serve, and was not unwilling to please the Emperor, from whom he hoped to obtain the electoral hat. Spinola was thus handed over to Leibniz, who, through the sister of the Duchess Sophia, Louise Hollandine, abbess of Maubuisson, had been introduced to the great French theologians, Pelisson, Huet, and Bossuet, with whom he carried on a voluminous correspondence, and who was, besides, familiar with similar projects of union. For he had lived at the court of the enlightened Schönborn, who, with Boineburg, did so much to establish religious peace, in whose dominions the Council of Trent had never been acknowledged, and who sided with the Liberal Gallican clergy against the pretensions of the Pope, denying his supremacy, and aiming at the independence of the National Church.[1] Boineburg's and Leibniz's letters during that period contain many references to the desirable union of the Old Catholics and the Reformed Catholics (Protestants), and the endeavours of Schönborn extend to the time of his death in 1673.

Spinola found at Hanover not only those who desired to further his ends, but also one so expert as

[1] See Leibnitii opera, vol. i. p. 559; and Guhrauer, Leibniz's deutsche Schriften, vol. i., appendix, p. 13.

Leibniz in conducting intricate negotiations. Moreover, the Protestant clergy of that country had been trained at the university of Helmstädt, where Georg Calixt had been propounding his enlightened views as to the fundamental unity of the three Churches; and the first Church dignitary of the country, Molanus, abbot of Lokkum, was associated with Leibniz in the management of the negotiations. A celebrated book naturally presented itself as the basis of explanations and discussions. It was the 'Exposition de la foi de l'église catholique,' by the great Bossuet, afterwards Bishop of Meaux. It was published in 1671, was well known, having been translated into all European languages, and ran through many editions. This remarkable book had been called forth in the midst of the opposition which the Protestants in France continued to offer, in spite of the oppression and persecution of the Government: it was an attempt, not to force, but to convince them, by explaining the different positions of the Council of Trent, by offering a sort of apology for the Church and her principal doctrines. Not one point was yielded; but the reasonableness and conformity of the dogmas, to which the Protestants objected, with the spirit of Christian teaching was shown, and an attempt made to divest them of their apparent rigidity. It was therefore natural that Leibniz at an early stage should write to Bossuet himself as follows: "Every one thinks very highly of your book on controversies; and the Bishop of Tina (Spinola), who was here on the part of the Emperor (and who thinks with you that gentler means must be used), was delighted with it." In an answer to this letter, dated 1679, Bossuet stated that a new edition of his work was in the

press, with a brief from his Holiness (Innocent XI.), who gave to this work the most authentic approbation, and expressed the hope that it might do good to those Protestants who did not believe that the doctrines he expounded were those of the Church. But the concessions offered by Spinola were far more startling. The anathema which the Council of Trent had pronounced against all non-Catholics was to be withdrawn, a new council was to fix the doctrines and the constitution of the reunited Church, and the Protestants were to be asked to acknowledge the supremacy of the Pope merely for the sake of rule and order in the Church. The Protestant clergy were to be permitted to marry, and much freedom granted to the organisation of the churches in different countries. Upon this basis a scheme of union was elaborated in 1683. The principal object was to bring the Protestants back into the pale of the Church: differences of doctrine should be settled afterwards, and the stigma of heresy withdrawn from every one who would admit that a general council, as the organ of the Church, could not err. The Pope and many of the dignitaries around him agreed to this scheme, and the Duke of Hanover, as well as the Emperor, for political reasons, were bent upon a speedy execution of the project. Bossuet, with whom Leibniz had entered into correspondence, condemned a union which rested upon merely external agreement, and which left the points at issue for after-consideration. He maintained, with great frankness, that the Roman Church would never really yield a single dogma, and that only in the less important question of church government certain concessions might be made. Leibniz continued the argument with Bossuet,

even after the project of Spinola had been practically abandoned.[1] He had himself calmly reviewed the different methods employed by Bossuet and Spinola, and, with the eclectic spirit peculiar to him, he had defined for himself a different way, which should combine the advantages of the others. M. Foucher de Careil, who has collected the theological writings and correspondence of Leibniz, and shown their true connections, has pointed out how early our philosopher had laid down certain rules[2] for putting an end to the controversies. The most important of these rules are the second and third, according to which the task of bringing about an understanding should be delegated to a "reporter," who is neither judge nor party nor conciliator, but whose truthfulness is manifested in this, that "no one shall be able to find out which side he takes himself,—this being an evident sign of his moderation and fairness." This idea of representing the two sides of the religious controversy —the views of the Catholics and Protestants—in the impartial language of an unbiassed observer, and by doing so of facilitating the mutual *rapprochement*, led Leibniz to compose several papers, which have been found among his manuscripts, and, having been edited without the necessary explanations, have led to many singular conclusions as to

[1] Biedermann, who in the second volume of his work gives a very lucid account of these projects of union, shows how soon the political interests—which inclined the Emperor and the Duke of Hanover to further these schemes—gave way to the opposite tendencies. The union was to have increased the Emperor's power in Germany. But no sooner had the Spanish succession roused the ambition of the Emperor, and the English succession that of the Duke of Hanover, than the policy of compromise—equally distasteful to the Popish Spaniard as it was to the Protestant English—had to be discarded.

[2] See Œuvres de Leibniz, tome i. p. 91.

his own religious opinions. The most celebrated of these is the 'Systema Theologicum.' The unfinished manuscript to which some person has attached this pretentious title was first published in Paris, with a French translation, in the year 1819. It was afterwards seized by several ardent Catholics, edited by the Abbé Lacroix, commentated, and placed before the world as the religious testament of Leibniz. An English translation, with an introduction and notes by Professor C. W. Russell, was brought out in 1850, and proof was attempted to be given that this remarkable document was an exposition of Leibniz's own innermost opinions, disregarding the fact of his having, at least formally, remained a Protestant to the end of his days. We are not placed in the position of having to reconcile such contradictory evidence. The manuscripts of Leibniz have since been more completely edited, and among them one, entitled 'Projet de M. Leibniz pour finir les controverses de religion,' has been published by Foucher de Careil,[1] from which it is evident that Leibniz intended, in the so-called 'Systema Theologicum,' simply to give such an exposition of the principal Catholic dogmas as might be acceptable to such as were not within the pale of the Church, and which might thus assist in bringing about the desired union.

This union was not accomplished; but the efforts of Leibniz, however, to put peace and harmony in the place of strife and dissent, were not concluded with the failure of this scheme. Outside of the great schism between Catholics and Protestants there was the discord of the Protestant Churches among themselves. This was

[1] See Œuvres de Leibniz, tome i. p. 81, &c.

proverbial at the time,[1] and furnished one of the great pleas which Catholics then, as now, advance in favour of the unity of their own Church. On an earlier occasion, that of the meeting of Catholic, Lutheran, and Reformed divines at Thorn in 1645, where a conciliation of the three confessions was attempted, some of the Lutherans insisted that the magistrates should repeal the law which had been passed, forbidding personal invectives being pronounced from the pulpit against members of the Reformed Church. There was therefore room in the Protestant section of the Church, as well as in the Church at large, for the work of the peacemaker. And unity among the Protestants now seemed to Leibniz much more important, because, through the peace of Ryswick, the Catholics had gained great advantages; and since, both the Elector of Saxony (originally the leader of the Lutherans), and the Elector of the Palatinate, the leader of the Reformed Church, had joined the Roman Church. Thus the Courts of Brunswick and Brandenburg became the representatives of the two Protestant Churches, and a union appeared not unlikely. This time, however, Leibniz advocated mutual tolerance and united action against the common enemy rather than unity in matters of belief. His former endeavours as a peacemaker had shown him how difficult it was to gain agreement in such matters, and the object of this new attempt was more political than religious. The Elector of Brandenburg, however, was neither so moderate nor so experienced and diplomatic as Leibniz,

[1] Spinola said to the Berlin theologians that this discord must necessarily lead to the result that there would be as many religions as parish churches.

and at once instructed his chaplain, Daniel Ernest Jablonski, to put down the preliminaries of a union. This tract went to the root of the difference in matters of faith, and professed to show "that in the most important truths of the Christian religion there was no difference between the two Churches, and no reason for separation." It was submitted by Leibniz to the Lutheran professors at Helmstädt, and to Molanus, the abbot of Lokkum, and a reply was sent in his and in the name of Leibniz, with the title 'Via ad pacem.' Leibniz further composed a tract specially for Spener, whose influence was of great importance, with the title "Tentamen irenicum"; but Spener relished these compromises as little as he had done those between Catholics and Protestants. Jablonski was, nevertheless, despatched by his master, the Elector of Brandenburg, to a conference in Hanover with Leibniz and Molanus, and returned with great hopes of achieving the union. Difficulties, however, seemed to increase on all sides, and finally the war of the Succession, and that between Sweden and Russia, engrossed the attention of all public leaders, and cast into oblivion the question of internal policy. It was again revived when the marriage of the Crown Prince of Prussia with Sophia Dorothy of Hanover, representatives of the two confessions, was negotiated; but a personal arrangement having been arrived at, the ruling princes themselves took less interest in the question of a general union. Leibniz received distinct orders from his master to abstain from further discussions, and closed his activity in this respect with the memorable words to Fabricius in Helmstädt: "As things now stand, I expect nothing further from the scheme of

union. Ipsa se res aliquando conficiet." Equally without result remained the correspondence which Leibniz and Jablonski shortly afterwards carried on with the Archbishop of York, and which originated in the intention of the King of Prussia to introduce in his country the English Liturgy and the constitution of the Church of England.

It is not without the feeling of regret that we have to record the disappointments with which the last decade of the life of our philosopher was filled. Though many of his favourite schemes were destined to be carried out under more favourable circumstances, he himself was doomed to see them either abandoned or condemned to temporary oblivion. His projects for the foundation of academies, his plans for the union of the Christian Churches, his ideas of a general scientific language, his views as to the extension of geometric research, all seemed to end in disappointment. His influence at the Courts of Hanover and Berlin, after the death of the Duke in 1698, of the Queen of Prussia in 1705, and of the Duchess Sophia in 1714, decreased more and more, and towards the end of his life he had to submit to a mortifying correspondence with the minister Von Bernstorf, who wished to keep him within the limits of his official position, as historiographer to the house of Brunswick, and who let him feel the displeasure with which his lengthened absence in Vienna was viewed by withholding his salary. It was not unnatural that under these circumstances, and irritated by the attacks of the friends of Sir Isaac Newton, who had gained considerable influence with Leibniz's master, now become George I. of England, the philosopher longed for a change of abode

and occupation, and entered into correspondence with his friends in Paris. The death of Louis XIV. in 1715, and other circumstances,[1] however, stood in the way of any intended change; and not long after, in the year 1716, on the 14th of November, Leibniz himself died during an attack of gout and stone, in the seventy-first year of his age. His death created no sensation in Hanover, where he had no friends, and his funeral was attended by no one except his former secretary Eckhardt. A Scotch gentleman, John Ker of Kersland, who was a friend of Leibniz, and happened to be at Hanover when he died, wrote in his Memoirs that Leibniz "was buried more like a robber than, what he really was, the ornament of his country."[2]

As Leibniz wrote on nearly every subject and was by nature very communicative, we shall not be surprised to find among his literary fragments, preserved at Hanover, materials for an autobiography and for an estimate of his own character.[3] His secretary, Eckhardt, has also left some valuable notices regarding his external appearance and his habits. He was of middle size and slim in figure, with brown hair, and small but dark and penetrating eyes. He used to walk with his head bent forward, which may have arisen from near-sightedness, or from his sedentary habits. It is needless to repeat that his industry and learning were almost without limits, and that he was endowed with an excellent

[1] Among these seems to have been the condition that he should become Roman Catholic. See Guhrauer, ii., p. 316.

[2] See the Memoirs of John Ker of Kersland, vol. i. p. 118: London, 1727.

[3] See the Appendix to Guhrauer's Biography.

memory, quick apperceptions, and much inventiveness. Of all this his life and his works give the best proof; and even so short a survey as the one we have given suffices to impress it on the reader. It is of greater importance for the knowledge of his philosophy, which was an outcome of his character and individuality, to understand what was the natural bias of his mind, and to see clearly what peculiar eminence, and what defects, it implied. Born as he was in the middle rank of life, surrounded by practical as well as scientific interests, versed in the old and the new philosophy, thrown among believers of opposite creeds, equally acquainted with the language, taste, and peculiarities of two nations, early accustomed to legal casuistry and compromise, to mathematical calculations, to algebraical definitions and distinctions, and to arithmetical minuteness, his mind seems to have been the receptacle of apparently opposing influences, a focus in which the scattered tendencies and aspirations of his age united. In many other minds, even of no ordinary ability, these separate interests and distracting claims led to nothing better than lifeless acquisition or meaningless activity. To many contemporary observers Leibniz's own literary character and activity must indeed have presented this appearance. Not to the few, however, with whom he stood in philosophical correspondence, nor to us who, in surveying his varied efforts, have continually been led from his numberless points of contact with the world to the centre of a few leading principles, and from these back again to their equally numerous applications. The eye which beheld the confused spectacle of nations, creeds, sciences, and habits, all at war with each other, was not

merely the eye of an observer and reporter; it was the eye of a philosophic mind—a medium which not only received the impression, but gave it back again in a well-arranged and orderly picture. The life and power of Leibniz were consumed in describing to his friends the process by which, in his mind, order sprang out of disorder, how light dawned upon chaos, how opposites could be reconciled, the scattered combined, the seemingly paradoxical made rational, a desert converted into a fruitful field, and hope take the place of ruin and despair. Nor did he deceive himself as to the merely initial and preparatory character of his work. "We seem, as it were, to stick at the entry of the roads to science, and to be prevented by a spell from investigating more eagerly the benefits of the Creator. . . . The eyes of men are still covered with a bandage, and we must await the time when all will be ripe." And again his device, "Le présent est gros de l'avenir." This central position, from which he marked the paths on which the thoughts of men should travel for centuries after him, is the only one from which we can conceive the union of those two characteristics of his mind—the love of practical application, and the desire to go to the root of everything. For the hindrances in the way of progress were, according to Leibniz, largely owing to confusion of terms and obscurity of thought, and by removing these—*i.e.*, by going to the beginning and foundation—the way was opened up by which these obstacles could be turned or overcome. It may be remarked that few of his schemes were successful, and that many of his ideas lay dormant, awaiting more favourable circumstances. Even in mathematics, his friends James

and John Bernouilli used his new methods with greater advantage than he did. This fact points to a greatness, but also to a defect, in his character. It seems that he never cared to descend from the central position which he occupied into the outlying regions: he stood always at the fountain-head, and viewed merely from a distance the many courses which led away from it into actual life. While he never lost sight of the unity which pervaded everything, he abstained from throwing the whole and united energy of his mind into one channel, which might have freed it from obstacles, and traced at least one clear way from the fountain of thought and belief to the sea of trouble, labour, and suffering. Would he have risked to lose that faith which lived in him if he had ventured to step down from his merely contemplative position? As it was he never lost it. Though his plans failed, though his friends died and his foes triumphed, his last days were filled with the same youthful aspirations, the same fruitfulness of ideas, the same readiness to begin anew; but he could not look back on any great success, on any lasting achievement, on any permanent work, on any finished monument of his genius. With all the versatility of his intellect, there was something motionless and cold in his attitude. Following what we must consider a deep-rooted inclination of his nature, he chose positions in life, in which he was comparatively unmolested, where he could observe and sympathise with the work of those around him, without being forced to take a leading part in it. He held himself aloof from the crowd, and cultivated those relations in which there was neither much waste of feelings nor food for the emotions. It would not have

been necessary for him to abandon his literary career in order to take part in the work of the day, or to have sacrificed that repose which is the privilege of the philosopher. Had he given himself to the working out of any one of his many great ideas, had he thrown his whole energies into at least one finished production—had he lost himself in the admiration of some intrinsically beautiful object, or concentrated his feelings in one ruling affection—his life and writings would have, we feel sure, gained a depth and meaning which all the erudition and many-sidedness of his intellect could not supply. Or had he been obliged to work his way through want to competence, through persecution and opposition to freedom, through doubt to certainty and belief, his work would have glowed with that warmth and colour which springs from the heart. But just as he was wanting in few of those gifts which are withheld from others, he was singularly favoured with those possessions which others have to acquire, but in the acquisition of which human nature gains its pronounced individuality, its moral character. The fire of enthusiasm, which fuses into one living idea or aspiration the longings of a great soul, was not kindled in the heart of Leibniz. Though we find faith and love and hope pervading the whole of his life and writings, his faith was only the undisturbed adherence to early beliefs, his love only the glow of universal benevolence, his hope only a confidence in the ultimate success of the leading principles of his philosophy.

Taking this view of the greatness and the shortcomings of Leibniz's character, it will not be difficult to understand and appreciate the opinions which his many

critics and biographers have passed upon him. Some have blamed him for the servility with which he clung to princes and persons in high position; others for his want of patriotism, in using almost exclusively the French language, and in making repeated overtures to foreign rulers. Others, again, called him fond of money and of glory, and complained that he set aside his own opinions in order to please every one. None of these criticisms points to any very serious moral defect, even supposing them to be correct. That he lived at the courts of princes was more a result of circumstances than of choice, and if he became a courtier, it must be remarked that he never slavishly submitted to any one. He had a great power of accommodating himself to persons as well as opinions, and it was more an outcome of his mental character than of prudence if he said, "No one has a less censorious mind than I have. It sounds odd. I approve of most that I read. To me who know how differently things can be taken, in the course of reading, usually something occurs that excuses or defends the author. Thus those passages are rare which displease me in reading." Lessing says of him, "He willingly put his system to one side and tried to lead every one to truth on that road on which he found him." And Leibniz said himself, "En général il est bon qu'on se mette à la portée de tout le monde, pourvu que la verité n'en souffre pas." And again, "Cum Socrate semper ad discendum paratus sum."

On the other hand Leibniz did not escape the evil influence which the shallow interests of many persons in high position must necessarily exert on every member of their circle; and though he was especially favoured by

living with those who were exceptions to the rule, his fate was that of all those

> "Who waste their morn's dew in the beams of the great,
> And expect 'twill return to refresh them at eve."

His apparent want of patriotism was, however, more the outcome of his varied interests and his cosmopolitan learning than of the society of princes, whose policy was indeed not unfrequently both unpatriotic and selfish. But it is quite impossible to make out, as Pfleiderer has tried to do, that Leibniz was especially German, and to set him up as a type of patriot in that unpatriotic age and society. That he felt for the woes and sufferings of his country is just as true as it is that he would have felt the same interest in any other people with whom he might have come into contact, and not to search for a remedy for their sufferings would have been impossible to his philosophical and benevolent disposition. As to his love of money, it does not seem to have amounted to more than the wish to be and to remain independent. His foresight in spending only his income of the previous, not of the current year, was prudent in one who was born and lived in comparative affluence, and who knew the uncertainty of the conditions which surrounded him. He left only a small fortune, and it is certain that he did many a kind and liberal act. Love of fame is common to all who have tasted it. In Leibniz it was not great enough to overbalance the natural propensities of his mind. For it must have been clear to him, both in his mathematical and in his philosophical studies, that to keep his ideas to himself, and develop them systematically, would have been more to his personal advantage. The desire, however, to scatter the seed of new ideas

broadcast, rather than to attend to their growth, made him publish his discoveries in his extensive correspondence as soon as he had made them, exposing himself thus to many a misrepresentation, and to the plagiarism of others.

The weak side of Leibniz's character—his want of warmth and enthusiasm, of passionate and energetic feeling—is most apparent in his treatment of religious questions. Though his faith was simple and unwavering—though he saw clearly through the cloud of doubts which then, and since then, have troubled many—his faith does not seem to have been a matter of the heart, and he laid himself justly open to the criticism of his friends with whom he corresponded on religious subjects. One of them remarked that he was not sure "if Leibniz, through too much refining, had not landed in indifference." His plan also of the external fusion of the two Churches, and the remarkable attitude which he assumed in writing an impartial exposition of the Roman Catholic faith, could only belong to one who took an intellectual interest mainly in those important questions. To those for whom religion was a practical concern, whose faith was the leading spirit of their lives, such ideas must have appeared cold and unpractical. Whilst we can sympathise with them in condemning such coolness, we cannot for one moment allow that Leibniz's faith—be it now ever so much a matter of the intellect, and not of the heart—was feigned or unreal. On the contrary, it was a genuine trait of his character: he had inherited it from his mother, cherished it in his childhood and youth, had found no reasons to abandon it when he became acquainted with science and philosophy, and was bent upon nothing more eagerly and persistently than

upon reconciling his religious opinions with the claims of the understanding.

Why expect more from him? Why look for action in one who was so great in thought? Why lament the absence of the internal fire of love and enthusiasm, when we owe so much to breadth of view and logical clearness of argument? Is it not as much as wishing that the philosopher had been something else than he by nature was?

This remark would hold good if Leibniz had been a philosopher by profession. But much of the interest that attaches to the man and his teaching would be lost if the latter was the result of a purely scientific investigation, of intellectual criticism, based upon learning and prompted by natural acuteness of thought. Though Leibniz had all this, he had and was something more. He was a man of the world, who took his share of the actual work of the world, and never retired into the study of the purely literary and scientific inquirer. He deliberately preferred the position of a statesman and politician to that of a university professor. In this respect he resembles some of the great philosophers of antiquity. His philosophical ideas were gained and matured in the intervals of a many-sided practical occupation; the highest conclusions he arrived at were the result of meditation and action during a long and unusually busy life. As such we must regard them. After becoming acquainted with the main features of his philosophy, we must remember the peculiarity of the circumstances and the character of the man which combined to produce it, and look in both for an explanation of much that would otherwise be unintelligible.

PART II.

THE PHILOSOPHY OF LEIBNIZ.

CHAPTER I.

THE PRINCIPLES OF LEIBNIZ'S PHILOSOPHY.

Leibniz was not a philosopher by profession: he did not set about the solution of philosophical problems in a methodical manner; he did not concentrate his energies on the production of a single work of paramount importance. Though philosophical problems were always before his mind, it does not seem as if he gave to them, at any time of his life, the uninterrupted and exclusive attention which they received from other thinkers, before and after him. To describe clearly and succinctly his system of philosophy has therefore been always a difficult task, critics and opponents have had easy work, and most of his ideas have passed into popular literature in a mutilated form. Some historians of philosophy have tried to put together a coherent system of thought out of the scattered and plentiful materials contained in his numerous writings, without sufficiently considering

whether—if such a task had been undertaken by Leibniz himself—he would not have found himself compelled to modify or amplify many of the views to which he clung tenaciously in his correspondence and casual writings.

Leibniz has not left a finished system of philosophy, as Plato and Spinoza did before him, or Kant and Hegel after him. He collected his materials on all sides, and found them almost everywhere—in science and in life, in writers ancient and modern, among friends and opponents. However, he only arranged these materials, modified and altered them, invented methods for harmonising them, and suggested principles and ideas by which they might be united in a comprehensive and coherent system or edifice of thought. But he did not rear this edifice himself. Its leading features were clear in his mind; but he did not prepare the working plans, or superintend the actual building. So far as this was done, it was done by others after him; and as they rarely possessed his powers of intellect, or the varied knowledge which was at his command, their work must be viewed with some suspicion.

However much we may regret the fact that Leibniz has not collected his many philosophical ideas into one comprehensive system, there can be no uncertainty about the principles upon which his philosophy was grounded. These he repeatedly enunciated,—mostly in his correspondence and in his controversies, rarely in separate treatises specially intended for that purpose. Representing the ultimate fixed convictions of a mind such as his, the result of his thought and the outcome of his experience, they possess an interest far greater

perhaps than the more finished works of other philosophical writers.

We shall first of all examine these principles of Leibniz's philosophy, and then consider how far they harmonise with each other, and to what extent they can be joined together so as to form a comprehensive and general view of things.

As we have seen in our biographical sketch, Leibniz entered on philosophical researches after he had been familiarised with logical, legal, and mathematical studies. We shall therefore be prepared to find him import thence certain leading ideas into his philosophical thinking. One of these he put prominently forward both in his earlier and later writings. He termed it the law of continuity, and expressed it in various ways. It was originally a generalisation of the property of numbers—viz., that they can be continued without end, and divided without limit,—and referred, in this respect, to the infinitely large, in which everything is contained, and to the infinitely small, of which everything is made up. We know, moreover, that Leibniz, through his investigations of the properties of finite and infinite series, was led to the invention of the infinitesimal calculus, in which general methods were given to deal with quantities which change, not abruptly, but imperceptibly, by infinitely small gradations—*i.e.*, continuously; and the importance of these continuous methods was thus much impressed on him. At an early period Leibniz was accustomed to conceive of lines as generated by the movement of points, surfaces by that of lines, and solids by that of surfaces: the analytical methods of Descartes had, moreover, shown the convertibility of one curve into

others, by infinitely small changes; and it was thus that Leibniz became accustomed from the first to look upon everything as a number in an infinite series, and connected with everything else through an infinite number of intermediate things or phenomena. The analytical and geometrical relations, and the convertibility of one figure into others, became for him the symbol of the metaphysical relations of things.

Thus Leibniz began with geometrical conceptions, and said to Arnaud, in the year 1686, that he intended to give geometrical proofs in his metaphysics, supposing only two axioms. The first of these was the principle of contradiction; that two contradictory statements cannot be true at the same time: the second was the principle that nothing is without a reason. These two principles, the principle of contradiction and the principle of sufficient reason, have, since the time of Leibniz, been generally adopted in treatises on logic. Leibniz was the first philosopher who distinctly placed the second principle side by side with the first, at the beginning of all philosophical inquiry.[1]

With these three principles, the one geometrical, the two others logical, Leibniz notified his adherence to what is frequently called the mechanical view of things. It affirms the interdependence of all things according to certain established connections, in the same way as the different properties of a triangle or of other geometrical figures are connected, one following out of the other according to a necessary process of thought.

But this mechanical view of things only affirms their necessary connection and interdependence. It only main-

[1] See Ueberweg's Logic, translated by Lindsay, p. 283.

tains that if you start from a certain phenomenon or occurrence in time or space, you can, through the necessary connections (which must be discovered by scientific research), reach all others; but it gives you no insight into the reason why, in a certain place and at a given moment, exactly this one thing exists or occurs and not rather something else. The mechanical view presupposes a general order of things, but it leaves unexplained why this special order or arrangement exists, and not any other of the many imaginable arrangements. This defect in the mechanical view was very early known to Leibniz; and in a tract belonging to the year 1668,[1] he urges the insufficiency of the principles adopted by modern philosophers such as Galileo, Bacon, Gassendi, Descartes, and others. In other words, we may say that the principle of sufficient reason had in the mind of Leibniz a further meaning. He did not look for the necessary connection of things and phenomena merely, as the geometrician does; he did not look merely for the determining causes which surround each thing, and, as it were, keep it in its right position: but everything had for him likewise an individual side,—it possessed a permanent essence, capable of receiving and giving impulses, and this essence or individuality required to be further studied and explained.

There can be no doubt that the philosophy of Descartes, with which Leibniz became intimately acquainted while he was in Paris, must have stimulated him to define his ideas on these matters more clearly. In this philosophy, the essence of external things had been defined as extension, the essence of mind as thought;

[1] Confessio naturæ contra atheistas. Erdmann, p. 45.

and there were thus two distinct problems—viz., to explain natural (*i.e.*, external) phenomena by purely geometrical considerations, and to define the relations of mind and body, of internal and external phenomena. It is therefore natural to find Leibniz occupied for many years with these two problems, and, in the endeavour to advance their solution, to find that he developed the leading principles of his own philosophy. He began by stating his objections to Descartes' philosophy, which he calls the antechamber of truth. Questioned by a friend whether his own conducted one into the interior, he answered playfully, "Only into the audience-chamber," it being enough to "obtain an audience, without pretending to penetrate into the interior."[1]

The distinction (peculiar to Descartes) of extension and thought, the former being the property of external things, was incapable of explaining the phenomena of motion; for if external things were merely extended, their properties must be purely geometrical. Now the phenomena of motion showed that the properties of bodies were not purely geometrical; bodies cannot be moved from one place to another without offering resistance, and Descartes himself was forced to endow external things with a special property, which he called the property of persisting always in the same state in which they are.[2] We now call this property inertia.

Leibniz maintained, as other opponents of Cartesianism had done before him, that this property of inertia was not a purely geometrical property, that it pointed to the existence of something in external bodies,

[1] See letter to a friend, 1695.

[2] See Descartes, Œuvres, vol. iii. p. 158.

which was not extension merely. This something he called force, and maintained that external things were endowed with force, and in order to be the bearers of this force they must have a substance. In short, external things were not merely geometrical figures, they were substances.[1]

With the conclusion that external things were not lifeless and inert masses, but that they were the centres and bearers of force—*i.e.*, of an active principle—the contrast between mind and matter promised to disappear. The mathematical and dynamical inquiries of Leibniz would not have led to the same result in the mind of a purely scientific inquirer. But Leibniz was not a scientific man in the modern sense of the word. Had he been so, he might have worked out the conception of energy, defined mathematically the ideas of force and mechanical work, and arrived at the conclusion that, even for purely scientific purposes, it is desirable to look upon force, not as a primary quantity, but as a quantity derived from some other value. He might have done this without entering on a philosophical inquiry into the nature of force, or of energy, or of substance. But this would have required the self-negation, the reluctance to enter the province of conjecture which was peculiar to a mind like that of Newton. Leibniz was a philosopher, and as such he had certain primary principles, which biassed him in favour of certain conclusions, and his discovery that external things were substances endowed with force was at once used for the purpose of applying these principles. One of these principles was the law of continuity, the conviction that everything in the world

[1] See Erdmann, p. 112, &c.

was connected, that there were no gaps and chasms which could not be bridged over. The contrast of extended and thinking substances was unbearable to him. The definition of the extended substances had already been found untenable: it was natural that a similar inquiry was made into the definition of mind, the thinking substance. What was the result of this?

Leibniz agreed with Descartes in considering thought the characteristic feature of mind, but he could not agree with him in limiting the thinking process merely to clear and distinct thoughts. On the contrary, there existed an infinite gradation of thoughts. Only a small portion of the contents of our thoughts rises into the clearness of apperception, "into the light of perfect consciousness." Many remain in a confused or obscure state in the state of "perceptions," but they are nevertheless there; they influence our clearer conceptions, and they are ready to rise into consciousness or disappear again, as our attention may be fixed upon them, or as they may now be called up and now dispelled, in the ever-changing sequences of our inner life. The Cartesians had denied that animals were endowed with souls; but Leibniz, whose conception of mind was not a rigid one, saw no obstacle in the theory which endows the whole creation with mental life, this being, according to him, capable of infinite gradations.

If this conception of mind, and of the thinking process peculiar to it, at once widened the realm of mental life, destroying the contrast of animate and inanimate nature, it did yet more: it reacted on the conception of matter, of the extended substance. For it became evident that external or material things presented this

property of extension only to our senses, not to our thinking faculties. The mathematician, in order to calculate geometrical figures, had been obliged to divide them into an infinite number of infinitely small parts, and the physicist saw no limit to the divisibility of matter into atoms. The bulk, through which external things seem to fill space, was a property which they acquired only through the coarseness of our senses, which viewed as a compact whole, as a unity, that which in reality was a very complicated multiplicity of parts, which might be severed and put together again in numberless other ways. The thinking mind which investigated the connections of things could do nothing with that compact mass or bulk; for its purposes the compact unity had to be broken up, geometrically and physically, into an aggregate of an infinite number of infinitely small parts. Provided, therefore, that the intellectual aspect was the higher and more correct one, and that the intellect or thinking faculty was the supreme mental process, it follows, that the aspect revealed by the senses was inferior and confused,[1] and that the property of extension was not the real property or essence of material things.

The divisibility of matter was a property which had, long before Leibniz, been made the basis of the corpuscular or atomic theory, and this theory had been recently revived by several philosophers, notably by Gassendi. Leibniz followed the arguments of Gassendi to some extent, but he could not rest content in assuming that matter was composed of a finite number of very small (though not infinitely small) parts. His mathematical

[1] See Erdmann, p. 79.

mind forced him to carry out the argument *in infinitum.* And what became of the atoms then? They lost their extension, and they retained only the property of resistance—they were the centres of force. They were reduced to mathematical points, so far as extension was concerned; but if their extension in space was nothing, so much fuller was their inner life. Assuming that inner existence, such as that of the human mind, is a new dimension—not a geometrical but a metaphysical dimension—we might say that Leibniz, after having reduced the geometrical extension of the atoms to nothing, endowed them with an infinite extension in the direction of their metaphysical dimension. After having lost sight of them in the world of space, the mind has, as it were, to dive into a metaphysical world to find and grasp the real essence of what appears in space merely as a mathematical point. As a cone standing on its point, or a perpendicular straight line, cuts a horizontal plane only in one mathematical point, but may extend indefinitely in height and depth, so the essences of things real have only a punctual existence in this physical world of space, but have an infinite depth of inner life in the metaphysical world of thought.

This inner life of everything real, this mental existence, is not, however, a state of rest. The very fact that its characteristic feature is thought, shows us that it is a continued flow or development. For to think, means to change our ideas, to proceed from one conception to another, to call up new material out of the obscurer regions of our soul into the light of consciousness, and to deliver what is before us now to the shadowy region of memory. This continued flow or development is the very nature

of the mind, which is always filled with an infinity of thoughts, and requires no external help or additional impulse to proceed on the course of life which is peculiar to it. As the different properties of a triangle, of a circle, of any geometrical figure, though always present, nevertheless seem to follow each other necessarily, if one of them is stated, so the mind passes from one state to another through an intellectual necessity, not through any external influence. The whole essence of the soul is always present; but it is not always, and not in the same degree, brought into the focus of consciousness, and under the clear light of thought. And as the degree and the extent of clearness can vary infinitely, so there exist an infinite number of real things, and each is capable of infinite change or development.

The desire to see harmony and continuity in all things, the reluctance to admit of dualism and contrast, had found in the mind of Leibniz a powerful support in the mathematical conceptions of the infinitely small, which through infinite addition grows into finite and from finite into infinitely large dimensions. But this mathematical view had influenced the ideas of our philosopher in another direction, and led him to a conception of the relation of things, which was at once novel and far-reaching. Purely geometrical connections had been replaced in modern science by analytical formulæ; the extended geometrical figure, which spreads out before your glance its many spatial properties, had been condensed into an equation; the many properties of the figure were all contained in this equation for him who understood it; they were connected logically or intellectually; the spatial order had yielded to an intellectual order. As the mind throws

its light on the different links of that logical chain of reasoning, the different properties become revealed. And why should not the connection of real things in this world be of the same kind? What appears disconnected or not clearly linked together in space and time, would, to Him who originally thought or created everything, stand in the same necessary intellectual order and harmony in which the many properties (or parts) of a sphere stand to the mathematical mind, which possesses the key—say the equation or formula—of the figure. It was thus that all things were connected in the mind of the thinking Creator. As the cone, the cylinder, and the sphere were indelibly connected in the mind of Archimedes by that celebrated symbol engraved on his tomb, and engraved, ever since it was once thought out, still more indelibly in the mind of every mathematician; so the things of this world, like members of a logical reasoning process, are linked together intellectually in the mind of the Creator, ever since He thought them for the first time —*i.e.*, created them. The order of things, which to our confused senses appears as that of space, of time, and of cause and effect, vanishes in the clear light of thought, and gives way to an intellectual order in the mind of the Creator, of God.

Nor is it possible to conceive any other connection. Indeed, the things of this world are as isolated from each other, as the sphere, and the cone, and the cylinder are, or as are the many triangles and the many curves which exist in the mind of the mathematician, who, by thought, groups them all at once in his formula. But the things of this world are not merely links in a chain of reasoning —they have, as we saw before, an inner life. They not only

exist, but they are endowed with consciousness in varying degree—they know that they exist. The mathematical process only gives us an idea of the external order and connection of things; the real essence extends in a different direction — it extends infinitely into the metaphysical world of thought. Created things are images of the Creator; they are imperfectly and incompletely what He is perfectly and completely. In them the light of thought has dawned, but it shines with more or less brilliancy, now leaving everything dark, in a confused or unconscious state; now again illuminating, at least, a small portion of the inner world.

And it is equally unnecessary to maintain that there is any other than this intellectual connection between the real things of this world, since their inner relations which are of an intellectual order make them self-sufficient and complete. Here, again, we cannot fail to remark the analogy which exists between this conception of reality and the nature of any mathematical notion, which forms a link in the chain of purely logical reasoning. Every property of the circle, for instance, which is evolved out of its equation, may in itself be a sufficient definition of the circle, and from it as a beginning or as a centre may be evolved all the other properties. The equation or definition of a figure may be given in an endless variety of ways, each revealing a special property. The connection between these different forms of the definition is a purely intellectual one, and each expresses the whole nature of the figure, viewed from one particular point. Likewise the infinite number of real things express, each of them in a different manner, from a special point of view, the whole world—the whole of the wonderfully intermingled and

entangled chains of thought which constitute the essence of this world. We may express this idea with Leibniz by saying, that each real thing in its infinite intellectual life is a mirror of the universe—a mirror of the real connection between itself and all other things.

Two points have been gained by Leibniz's view of that which constitutes the essence of everything real, so far as we are now acquainted with it. Firstly, the law of continuity, the harmony of all things combined, has been upheld in every direction. Neither contrasts nor abrupt transitions are allowed in this theory. Secondly, every real thing has a separate individual existence. Though occupying no extended space, and reduced for our coarser senses to a vanishing point, it possesses an infinite world of its own, an endless expanse of inner life—viz., the world of thought. We may thus say that Leibniz, by his purely intellectual—not to say mathematical—view of reality, has so far combined the principle of continuity with that of individuality, the idea of universal order and harmony with that of individual independence. This has been gained by a further, equally important doctrine. If the connection of things is of an intellectual nature, there must exist a supreme intellect, a mind of perfect knowledge and wisdom, in which this connection exists as an infinite and infinitely interwoven chain of clear thought. This is the mind of Him who first thought or conceived, that is to say, created, the world,—it is the mind of God. The intellectual order and connection of things presupposes the existence of a supreme intellect, of a Creator, of a divine Ruler. But this is only one side of the doctrine. The intellectual order, the harmony of all things, presupposes their mutual independence.

Connected as they are in the mind of their Creator and Ruler, they neither require nor are capable of any other connection. As the apparent extension of real things in space had to vanish before the clearer view of reason, so likewise the apparent interdependence and interaction of real things must yield to a purely intellectual connection. Left to themselves, the real things of this world have no intercourse, they are powerless to act or to react on each other; they are solitary and self-sufficient. Their connection with each other exists merely in the mind of their Creator.

The apparent extension of matter in space was explained by the coarseness of our senses; how is the apparent material connection of things, their action and reaction on each other, to be explained? This question leads us to the last and culminating conception of Leibniz's philosophy.

The things of this world are created and are connected by an intellectual harmony in the mind of their Creator. Each of them represents the whole universe—*i.e.*, the aggregate of all existing things from a special, individual point of view. And all these individual, special views make up in the mind of the Creator—in the mind of Him who can intellectually grasp them all in clear thought—the comprehensive scheme which we call the world. Like the links in a logical process of reasoning, each real thing has its place, and is intellectually, though not materially, determined by all others. Each has an infinite life of its own, and is capable of development. And the present state contains the germ of the future. Nothing can be developed which is not prepared. Whatever may happen to any individual thing or substance,

whatever course its inner life may take, is a necessary outcome of its original nature, which merely manifests itself through the lapse of time. Thus it is that the things of this world, which are created in complete harmony with each other, continue to manifest this harmony or mutual agreement. The harmony of their essences, of their natures, guarantees the harmony of the whole of their appearance in time—of their phenomenal existence. And if the original connection of things is of an intellectual nature, if one follows the other as each thought springs out of another, the one compelling the other to come forward, then necessarily at any moment of time everything will appear to us to be connected with other things, and, as it were, brought forward by them, compelled by them to exist. In other words, while the things of this world will appear to us to act and react on each other, this action and reaction is merely a necessary consequence of their original natures, which are created and now exist in the mind of God in a necessary intellectual connection. The mutual harmony and agreement of everything real is thus guaranteed by its original constitution, in the original act of creation. It is once for all established for all times, it is pre-established.

This is the celebrated doctrine of the *pre-established harmony*, which Leibniz describes by different names, and which has been frequently misunderstood. It is a necessary consequence of the principles of his philosophy, of the desire to see order and harmony in everything, of the conviction that everything real has an individual existence, a nature and constitution of its own, and of the doctrine that the intellect is the full flower of indi-

vidual life and growth, and that the process of thought is the type of the real connection of things. In the course of years Leibniz's individualism and intellectualism changed his original belief in a general order and harmony into the doctrine of the pre-established harmony of all things. When he had reached this, his philosophical creed was established—he was at rest with himself.

It was, however, not till many years had passed and these principles were confirmed in his mind, that Leibniz adopted the two well-known terms under which his ideas have become current. The first, that of the "harmonie préétablie," we have made use of. It was not employed in the first public exposition of his ideas, under the title "Système nouveau de la Nature et de la Communication des substances," which appeared in the 'Journal des Savans,' 27th June 1695, nor was it used in the correspondence with Antoine Arnaud. But it is introduced in the first "éclaircissement" in reply to Foucher, which appeared in the 'Journal des Savans' in the year 1696. From that time the term "pre-established harmony" takes the place of what before had been more vaguely described as harmony, or order, or accord, or by a variety of other words. In a letter to Arnaud, dated 1686, he speaks of the "hypothèse de la concomitance, ou de l'accord des substances entre elles.".

The second term characteristic of Leibniz's doctrine is the term "monad." It takes the place of the word "substance," or "real thing," and is meant to describe the nature and essence of what is and what constitutes reality. This term, which we have intentionally not yet

employed, was introduced in the year 1697, and was probably borrowed from Bruno.[1] The peculiar views of Leibniz became current from that time under the terms "monadology" and "system of pre-established harmony."

The law of continuity, the conception of the monad, and the idea of pre-established harmony, are the three principles of Leibniz's philosophy. They run through all his writings, and form, as it were, the foundation-stones of his system, which he himself was wont to designate as the system of pre-established harmony. Leibniz explained and defended its principles with great patience, and with all the ingenuity and extensive knowledge which he possessed; but he only wrote one short sketch of his system, under the title "La Monadologie," in the year 1714. It was intended for the celebrated Prince Eugene of Savoy, with whom he became intimately acquainted during his last residence at Vienna, and was meant to assist the correct understanding of his views, which had been expounded in many short papers published in the learned periodicals of Leipzig, Paris, and Holland.[2] It was, however, not given to the world till 1720, in a German translation, and the original French text was only published by Erdmann in 1839.

In the copy of the "Monadologie" found by Erdmann among Leibniz's manuscripts at Hanover, there are numerous references to the only comprehensive work which our philosopher brought out during his lifetime

[1] See p. 73.

[2] See Leibniz's letter to Remond de Montmort, dated 26th August 1714. Erdmann, p. 704.

—the 'Théodicée.' It was of a controversial nature, and had a personal origin.[1] It is necessary to become acquainted with its contents in order to understand the practical applications of the principles of Leibniz's philosophy. But before doing so, it may be as well to note the great contrast which existed at that time between philosophical reasoning on the Continent and in England—a contrast which has become a landmark in the history of philosophy through the 'Essay' of Locke and the 'Nouveaux Essais' of Leibniz. A few words will suffice to point out the radical difference between the positions of these eminent representatives of two opposite and equally legitimate schools of thought.

A glance at the introductions to Locke's Essay, as well as at the 'Réflexions' on this essay by Leibniz, published in 1696, will at once show the great difference between the positions occupied by the two philosophers. If it has been difficult even for English critics to apprehend correctly the drift of Locke's argument,[2] of which that concerning innate ideas is put prominently in the foreground, we cannot be surprised that Leibniz's criticisms refer mostly to details, and leave the whole plan of the book untouched. Yet even on this he has some significant remarks. Locke had said in his introductory chapter: "I shall pursue this following method. First, I shall inquire into the original of those ideas, notions, or whatever else you please to call them, which a man observes and is conscious to himself he has in his mind; and the ways whereby the understanding comes to be

[1] See chap. v. Part I.

[2] See Prof. Fraser's Article on Locke in the 'Encyclop. Brit.,' 9th ed., vol. xiv. p. 758 *et seq.*

furnished with them," &c.[1] Against this Leibniz argues[2] —"La question de l'origine de nos idées et de nos maximes n'est pas préliminaire en philosophie, et il faut avoir fait de grand progrès pour la bien resoudre." He thus does not consider the question proposed by Locke to be an initial problem in philosophy. And if Locke says —"I shall imagine I have not wholly misemployed myself if, in this historical, plain method, I can give any account of the ways whereby our understandings come to attain those notions of things we have, and can set down any measures of the certainty of our knowledge," &c., Leibniz replies—"Pour ce qui est de la question, s'il y a des idées et des vérités créés avec nous, je ne trouve point absolument nécessaire pour les commencemens, ni pour la pratique de l'art de penser, de la décider, soit qu'elles nous viennent toutes de déhors, ou qu'elles viennent de nous; on raisonnera juste pourvû qu'on procède avec ordre et sans prévention." And if, lastly, Locke compares the human mind, before it receives sensations, in his first book with an empty cabinet, and in the second with a sheet of white paper, thus assenting to the axiom, "Nihil est in intellectu, quod non fuerit in sensu," Leibniz adds significantly, "nisi ipse intellectus."

In these three well-known replies to some of Locke's initial remarks, Leibniz has classically expressed the objections which the opposite school of thought have ever since urged against an investigation, which was systematically commenced by Kant more than fifty years later. Whether Locke's valuable researches lie really in the direction indicated by the passages quoted, is at least

[1] Essay concerning Human Understanding, Book I. chap. i.
[2] Reflections. See Erdmann, p. 137

doubtful; and it is only fair to remark that Leibniz speaks with the highest appreciation of his opponent, though he cannot agree with him in what he considers his principles. It is unfortunate that in the mind of many of Locke's critics the "tabula rasa" has played so prominent a part, having been considered satisfactorily to characterise his position. If Locke has suffered by having adopted this ready but misleading simile, we shall see hereafter how a similar use of an even less fortunate illustration has done harm to Leibniz's reputation. We have for this reason intentionally not yet introduced it in our exposition of his philosophical ideas.

Descartes laid down that there are certain capacities or faculties born w. a man, not "ideas" but powers to form ideas.
Locke completely misunderstood him when he attacked the Doctrine of Innate Ideas. His own view was not unlike that of D. for wh. a better name (v). be that of Connate Faculties.
Question at issue is "Is mind a tabula rasa antec[t] to all experience?" To say so, says Spencer, (Princ Psych 1. 467) is to ignore this? "Whence comes the power of organising experience?"
Bain's polemic ag[t] Innate Ideas misses point in same way as Locke's.

CHAPTER II.

THE SYSTEM OF LEIBNIZ'S PHILOSOPHY.

WERE philosophy merely a scientific research, or had Leibniz confined himself to the enunciation and application of a few leading principles only, as many of the philosophers of this country have done, his reputation and influence would have grown or vanished to the extent in which these principles were appreciated or abandoned. Instead of this, Leibniz's popular reputation was based upon a work which deals with a problem of practical interest. It was based upon the 'Théodicée,' an essay "sur la bonté de Dieu, la liberté de l'homme, et l'origine du mal," a book in which the principles of his philosophy are only casually and unmethodically treated, and where the great question of the relation between Reason and Faith is put prominently in the foreground. The true principles of his Thought remained very imperfectly known, and have only in recent times been made the subject of careful criticism. This circumstance throws light on the intellectual requirements of the age, and of the circle of readers which Leibniz addressed. They were widely different from those for whom Bacon wrote the 'Organon,' Newton the 'Principia,' and Locke his

'Essay.' However great the influence of Lord Bacon, however lasting the principles of the 'Principia,' however suggestive and permanently valuable the researches of Locke, in none of these works do their authors care to draw the ultimate conclusions of the views which they set forward, or to point out clearly the bearing which they may have on the highest questions of morals and religion. They were content to have a definite object and a clear method, and, without needlessly embarrassing themselves as to the far-off results, they saw ample work before them to employ their own ingenuity as well as that of their followers. It has thus been left to history to work out the remoter consequences of the positions they took up; and the revolution of ideas and beliefs which has been brought about in our century, as much by English as by Continental thought, did not trouble those pioneers in philosophy, nor the greater part of their readers. It was different on the Continent, —in Italy, in France, in Germany; and it is not difficult to find the reasons for this difference. We need only compare the peaceful and prosperous state of England in the times of Bacon, with the unsettled condition of Italy in the age of Giordano Bruno, of France in that of Descartes, and of Germany in that of Leibniz. Instead of a firm background of religious faith, which had gained independence for itself and for the people which espoused it, we find in the great Continental nations during the sixteenth and seventeenth centuries the endless contest of Church and State or the warfare of different creeds, and in no instance do we meet with a decided or undisputed victory. On the other hand, the rest which had come over England during the Elizabethan period

fostered the growth of arts, industry, and science, and these soon defined a multitude of problems for the student, and set the thinker his special task, whereas the unrest and uncertainty of affairs abroad nursed scepticism and unbelief, and concentrated the thoughts of all the higher minds on those everlasting questions which the world at large was vainly trying to solve by force of arms. And whilst the work of an orderly and peaceful society ever calls for division of labour, for co-operation and collective activity, and for all that machinery through which the small contributions of individuals unite in a great national performance, strife and disturbance on the other hand burden the individual with more than his share of labour, and waste the efforts of the many in the hopeless task of gaining for themselves that rest which society cannot afford. The works of Bacon, of Newton, of Locke, were reared on one and the same background of national greatness and welfare; the systems of Descartes, of Spinoza, of Leibniz, were the fruits of solitary thought. The former addressed in their writings a circle of readers who could afford to leave alone the vexing problems which had troubled ancient and medieval thinkers, and could concentrate their attention on details; the latter worked out for themselves answers to the highest questions, and wrote for those who had felt with them the foundations of belief trembling under their feet. If there is one feature more characteristic than any other in all the great Continental as compared with English thinkers, it is their solitariness.

It is therefore not surprising that much of Leibniz's time and thought was absorbed by the fundamental questions of practical life, and that, whilst his mind might have

done more useful work in applying to special problems some of his leading ideas, the great mysteries of destiny and free-will drew him off those more fruitful paths, and furnished the only subject on which he has produced a work of any magnitude. It is still less surprising that his philosophy should have become popular through such a work, whilst on the other hand many of his most valuable ideas have lain dormant for centuries.

Nevertheless, it must be admitted that the philosophical value of all new principles lies in the degree in which they work towards a unification of thought. Philosophy is nothing if it is not systematic; and in the highest sense it will be useless if it does not bring us face to face with those eternal questions, nor helps us in gaining with regard to them a clear and defined attitude. The principles of Bacon, of Newton, and of Locke will escape this final test as little as those of Leibniz have done, and the conclusions to which they lead will be drawn by posterity, if they were not drawn by their original propounders. But the eagerness with which the popular mind abroad, under the influence of political and social unrest, has always hurried to apply this test, has caused that remarkable and rapid succession of opposing systems in the ruins of which many valuable beginnings of thought have been prematurely buried. It is the task of the historian to disentomb them.

The principles of Leibniz's philosophy are for us of more interest than any systematisation of them which he himself or his followers may have attempted, though the latter has played a greater part in the history of philosophy. The inducements for Leibniz to show us how far he could, by means of his principles, solve the great

religious questions were many, and have been set forth in the historical sketch which we have given. We shall now cast a glance at the manner in which he approached those questions.

As we saw in the last chapter, every monad (an expression which we shall now make use of instead of saying a real thing) is isolated and self-sufficient: its inner state at any given moment is in reality only determined by itself—by its own former states. The ultimate ground of its existence, and of the whole course of its development, lies in Him who created it—in God. But as God has created the whole world, and has created it according to the perfect and transparent idea which lives in His mind, so He has created each monad to represent a certain phase or appearance of the whole. And all these phases or appearances, all these mirrored reflections, form in the mind of God, who grasps them all in one clear view, the complete scheme of the world. As in a stereoscope the two pictures must suit together or harmonise, so as to fall for the beholder into one clear image; even so the infinite number of representations of the whole world must be harmonised or tuned to the same melody, to form intellectually one perfect and clear expression or thought. In this way we may say that each monad determines—intellectually or ideally—the others, and in its own self bears the signs of being determined by all others, or represents all others. Nor was it difficult to follow out this idea more completely, and find the special manner in which one monad differs from others. It is in the different degrees of clear thought. In the mind of God Himself, the highest monad, everything is clear—there and there only is pure light; but in the mind of each

created monad there is light, and dusk, and darkness, in varying degrees. There is always a great deal of darkness; sometimes there is dusk or twilight, and sometimes clear daylight. Our unconscious self, which slumbers in the darkness of memory, represents the night; our sensuous knowledge or our perceptions represent twilight; our clear thoughts represent daylight. Monads which are wholly dark are by Leibniz called simply monads, those which have perceptions or twilight are called souls, those which have clear daylight or apperceptions are called minds. An infinite gradation runs through the whole of nature; nowhere is there a break or discontinuity. The activity of the mind tends towards clearness. This activity is checked where and when we are forced to be only perceiving beings; it is checked still more when our self lapses into unconsciousness, when the light is wholly extinguished. Every check to the activity of the mind is suffering. Now the darkness and the twilight exist in each monad to the extent that the stereoscopic picture of the whole world in the mind of God requires it, as the harmony of all monads makes it necessary. We may therefore say that the darkness in our minds is expressive of the extent to which we are passive or suffering through the existence of other things,—that the light of clear thought expresses the extent to which we act on other things. In the proportion of light and darkness, in that of action and suffering, lies the individual character of each monad. But the dark background of our minds is the storehouse of our thoughts: out of this store we continually recruit our ideas, into it they continually return. The dark store of the mind contains the material of our

thoughts,—it is the "materia prima," as Leibniz expresses himself.

It is not difficult to follow Leibniz into a great variety of other speculations, which spring out of this one. Two of them are of special interest to us. Ideas follow ideas with a certain necessity; one thought leads the thinking mind involuntarily on to others; dark perceptions try to gain light, confused thoughts strive for clearness; there is never any rest in the mental process; there exists an undying desire and longing to advance. This desire or impulse is peculiar to all beings or monads, but it is clear and conscious only to the thinking monads or minds. In them the world is not merely reflected, but it is consciously reflected; the eternal connection and continuity of everything is not only mirrored, but it is practically experienced and known. Thus, on a smaller scale, the conscious monads or minds repeat in their processes of thought the original work of God. They see to some extent, and with some amount of clearness, the original plan which lived in the mind of God when He created the universe. In this respect, the individual mind is not only a reflection of the world; it is likewise an image of God, of the Creator. If God is the mind of the universe, the real home of all the thoughts and connections which it exhibits; then, in the same way, the conscious human mind is the image not merely of the world, but likewise of its intellectual unity. The human mind is the microcosm in the macrocosm.

The human mind is not merely a reflection of the universe, it is a reflection also of the intellectual unity of the world—not a perfectly clear reflection, but a reflection more or less obscure, more or less confused. But the

tendency of the mind is here likewise towards greater clearness, towards the perfect light of its Creator. If the relation of the monads to each other, to the world at large, is expressive of the pre-established harmony of everything, forming so to say the world of nature, the relation of the thinking monads, of the human minds in the world to the Creator, is expressive of the intellectual or spiritual ground of that harmony—it forms the world of grace. The human mind being above the creatures of the material world in the scale of created things, it has a clear conception of these; but being beneath the spiritual beings and their Creator, it has only a dark conception of Him. The harmony of material things we can understand more and more clearly; the intellectual unity and meaning of that harmony we can only perceive dimly and indistinctly. The former is an object of observation through our senses and of thought, the latter is one of feeling and belief.

According to Leibniz, the fact that the beings endowed with mind, *i.e.*, the thinking monads, reflect the order of the world in two ways—viz., as unconscious mirrors, and also as conscious images of the mind of the Creator,—the fact that the mind of man can attain to a conscious knowledge of its Creator, is the reason why there exists a moral as well as a natural order. The minds of men who rise to a consciousness of their divine origin form together the city of God, the community of spiritual beings. In the world of nature God is known merely as the architect; in the world of grace, in the moral world, He rules as a king, through the conscious recognition in the hearts of His subjects. The two worlds agree with each other; in one sense they are identical—

they differ merely as to the point of view from which the universal harmony is contemplated. And this twofold aspect is repeated when we look at single things and facts in the same way as we look at the whole. The pre-established harmony not only guarantees the regular and consistent development of everything out of its preceding causes—of every new state, or phase, or event, or phenomenon out of those which were antecedent—but it also guarantees the continued conformity of all events or phenomena with the original plan which lived in the mind of the Creator. Thus everything in this world is subject alike to the eternal rule of efficient as well as of final causes. The reflection of the universe in each monad would reveal to us the unalterable connection of cause and effect, the mechanism of nature; but only in the thinking mind of man, who rises to a conception, however imperfect, of the intellectual meaning and unity of things, is the final cause, the end and aim of the world, foreshadowed. From his position the unalterable mechanism of natural events appears to serve an end, and to be expressive of an intellectual aim and purpose. This is the reconciliation of the teleological and mechanical views of nature.

The isolated and self-determining character of the monads, together with the pre-established order in which they stand to each other, form the basis of Leibniz's moral as well as of his intellectual philosophy. It is at once evident that as no real interaction exists between the monads, that the will or principle of action in the human mind has a different meaning in the system of Leibniz from what we usually express by this word. The entire life of the monad is an internal development, a progress

to greater clearness of thought, or a relapse into twilight and darkness. But as the conceptions themselves can be unconscious or conscious, indistinct or distinct, so the aspirations of the monads can be either unconscious impulse, or instinct, or lastly conscious desire—*i.e.*, will. It is important to understand in how far Leibniz can speak of a free will even within the narrow sphere of our purely inward life. It is evident that the mind is subject to quite as little constraint from outside, as it is itself able to carry its own action beyond the microcosmic sphere of its own self: the mind is quite free to follow its own special and individual development. In so far we can say the mind is free, and we can speak of the freedom of the will. On the other side the pre-established harmony of all things has prescribed likewise to every human being its peculiar course, and in the lapse of time everything is determined by that which precedes it, and, lastly, by the comprehensive plan of the universe. Leibniz cannot admit that perfect indifference between two possible events, the choice of which is to be left to the human will. The decisions of the will have always a sufficient reason. However imperceptible or hidden, there is always a predetermining cause why one alternative is chosen rather than the other. The case of a perfect equilibrium does not exist.

If, then, the human mind is determined in its own free development by the original and pre-established plan of the whole world, the question arises, whether this comprehensive plan or scheme is in itself necessary, in the sense that its opposite, or any other plan, would have been impossible. If this is the case, then the Creator Himself would have been forced, as it were, in the act

of creation by some overruling fate or necessity to make things exactly as they are, and not otherwise. This is not the opinion of Leibniz. According to his view, there were before the mind of God an infinite number of possible worlds, and among these His intellect selected the most perfect world in conformity with His eternal wisdom and supreme goodness. In this respect Leibniz distinguishes throughout his writings between necessary and contingent truths. The latter are the actual facts and events, which, for aught we know, might also have been otherwise. "The existence of God, the fact that all right angles are equal, &c., are examples of necessary truths; but the existence of my own self, or the existence in nature of things which have right angles—these are contingent truths. For the whole of the universe could have been different: time, space, and matter are absolutely indifferent to the movements and figures of bodies, and God has chosen among an infinity of possibilities that which He judged to be the most suitable. But since He has chosen, it must be admitted that everything is comprised under His choice, and that nothing can be changed, because He has foreseen all, and ruled for all times."[1]

If, then, the creative act of God has pre-established for all times the existing order of the universe, we must seek for the explanation of it in the ends and purposes which lived in His mind when among the many possible worlds He determined to create the existing one. These ends and purposes not being known or intelligible to us, there is ample room for the faith and trust of the believing soul. Were all the facts of nature and history necessary truths,

[1] See letter to M. Coste, 1707.

like the mathematical truths, the human intellect would have to decide regarding them, and would suffice to judge and explain them. But the contingent truths are those, the necessary connection of which we do not see. Only for him who could clearly discern the ends which the Creator had in view, when through His "fiat" the one out of many possible worlds sprang into existence, would they appear as necessary. Thus the contingent truths, the explanation of the facts of nature and history, requires a knowledge which is beyond our own. Faith transcends knowledge, it does not contradict it. The truths of religion are beyond, not contrary to the doctrines of reason. In this idea consists the reconciliation of reason and faith. What is against reason is absurd, what is beyond reason is unintelligible. It would be intelligible if we could understand the ways of God and His purposes. The faith in God, in His overruling power and wisdom, gives us at least an idea of that point of view from which the truths of reason and of faith, the necessary and the contingent, merge into each other.

But the doctrine of Leibniz, according to which everything is predetermined, prevents the possibility of our explaining the existence of evil in the world by the wickedness of man. For every individual—though free to follow his own inward nature and constitution—has been created, and is powerless to deviate from the path originally prescribed to him. The determinism of Leibniz necessitates us to seek for the explanation of evil and sin in the original plan of the world, which was chosen by the Creator. The determinism of Leibniz does not go the length of maintaining that only one world was possible—it holds that an infinite variety of worlds are

thinkable: among these God has chosen the existing one as the best and most perfect. The existing evil is thus an essential feature in its constitution; it must serve the ends of goodness and happiness which He had in view. How does Leibniz deal with this difficulty?

He closes his dissertation on the subject[1] with a legend which was suggested to him by an older writer, Laurentius Valla, who wrote a dialogue on the freedom of the will against Boethius. In this dialogue the answer which the oracle of Delphi gave to Sextus Tarquinius—

"Exul inopsque cadis irata pulsus ab urbe"—

gives occasion for the remark that Sextus would reasonably complain that Jupiter had prepared for him so cruel a destiny. Leibniz, not satisfied with the conclusion to the dialogue given by the author, who confesses himself unable to solve the mystery, takes up the parable where Valla stops, and continues it as follows:—

"The principal fault in the dialogue is, that it cuts the knot, and that it seems to condemn providence under the name of Jupiter, whom it makes, as it were, the author of the sin. Let us therefore continue the fable. Sextus leaving Apollo and Delphi, goes to see Jupiter at Dodona. He brings sacrifices, and then advances his complaints. 'Why have you condemned me, O great god, to be bad and unhappy? Change my fate and my heart, or acknowledge your wrong.' Jupiter answers, 'If you will renounce Rome the Fates will spin another destiny for you; you will become wise, and you will be happy.' Sextus: 'Why ought I to renounce the hope of a crown? Can I not be a good king?' Jupiter: 'No, Sextus; I know better what you need. If you go to Rome you are lost.' Sextus not being able to agree to so great a sacrifice,

[1] 'Théodicée,' Erdmann, p. 621.

left the temple and gave himself up to his destiny. Theodore, the high priest, who had attended at the interview between the god and Sextus, addressed these words to Jupiter: 'Your wisdom is adorable, O great ruler of the gods; you have convinced this man of his wrong, he must henceforward ascribe his misfortune to his evil will—he has not a word to say. But your faithful worshippers are surprised; they would have wished to admire your goodness as well as your greatness: it depended on you to give him another will.' Jupiter: 'Go to my daughter Pallas; she will show you what I had to do. Theodore journeyed to Athens; he was ordered to sleep in the temple of the goddess. In a dream he found himself borne into an unknown land, in which there was a palace of surpassing splendour and immense size. The goddess Pallas appeared at the gate, surrounded by the rays of dazzling majesty, *qualisque videri cœlicolis et quanta solet.* She touched Theodore's face with an olive-branch which she held in her hand, whereby he was able to endure the divine light of Jupiter's daughter and of all which she would show him. 'Jupiter, who loves you' (she said), 'has commended you to me for instruction. Behold here the palace of destinies which I guard. Here are representations not only of what happens, but also of all which is possible. Jupiter having made a survey before the beginning of the present world, has weighed the possible worlds, and has chosen the best of all. He sometimes visits this abode in order to have the pleasure of going over all and renewing his choice, with which he cannot fail to be satisfied. I have only to say the word and we shall see a whole world which my father could create, and where all that you could desire would be represented. And thus you could know what would happen if such and such a possibility were to exist. If the conditions are not sufficiently stated, there would be as many worlds as you wish, all different, which would answer differently and in every possible way the same question. You have learnt geometry in your youth, like all well-educated Greeks. You know, therefore, that if the conditions of a point in question are not fully defined, and if there are

in consequence an infinite number of points, they all lie in what geometricians call a locus. And this locus, which is frequently a line, will be defined, and then you can figure to yourself a whole string of worlds which will all, and which will alone, contain the case in question, and its conditions and consequences will vary with them. But if you take a case which differs from the actual world in one single point only and in its consequences, one definite world will correspond to it. These worlds are all here—*i.e.*, in the idea. I will show you some in which there exists not exactly the same Sextus whom you have seen (that is not possible; he carries with him always that which he will be), but similar Sextuses who will have all that you know already of the real Sextus, but not everything which is in him imperceptibly, and hence not all which will happen to him. You will find in one world a Sextus very happy and in a high position, in another a Sextus content in a middle station—in fact, Sextuses of every kind and of numberless ways.'

"Thereupon the goddess led Theodore into one of the chambers. When he was therein it was no longer a chamber but a world, *solemque suum, sua sidera norat.* At the command of Pallas, Dodona was to be seen within the temple of Jupiter, and Sextus leaving it. He was heard to say that he would obey the god, and it is he who is going to a city situated like Corinth between two seas. There he bought a little garden, in cultivating which he finds a treasure, and he grows rich, beloved, esteemed. He dies at a great age, cherished by the whole town. . . .

"Another chamber was entered, where Theodore sees another world and another Sextus, who left the temple, and, resolved to obey Jupiter, went to Thrace. There he married the daughter of the king, who had no other children, and he becomes his successor. He is adored by his subjects. Other chambers were entered, which all revealed new scenes.

"The chambers formed a pyramid. They grew more and more beautiful as one approached the summit, and represented more beautiful worlds. The highest chamber, which formed the top of the pyramid, was the finest of all, for the

pyramid had a beginning, but the end could not be seen. It had a point, but no base; it spread into infinity. It was, as the goddess explained, because among an infinitude of possible worlds there is one which is best, or God would not have resolved to create any one. But each world has one less perfect below it, and this is the reason why the pyramid descends into infinity. Theodore, on entering the highest chamber, was lost in ecstasy: he needed the support of the goddess, but a drop of the divine drink revived him. He could not contain himself for joy. 'We are now in the actual world,' said the goddess, 'and you are at the source of happiness. Behold what Jupiter prepared for you if you continue to serve him faithfully. Here is Sextus as he is and as he will be. He leaves the temple in anger, and despises the counsel of the gods. You see him going to Rome, putting everything in disorder, violating the wife of his friend. You see him here expelled with his father, defeated and miserable. Had Jupiter placed here a Sextus happy in Corinth or king of Thrace, it would have been this world no more. However, he could not fail to choose this world, which surpasses all others in perfection, and which forms the point of the pyramid, otherwise Jupiter would have renounced his wisdom, and banished me, his daughter. You see, my father has not made Sextus wicked—he was so from all eternity, and he was so by his free will; he has only given him existence, which he could not refuse to the world in which he was included; he allowed him to pass from the region of possible to that of actual being. The crime of Sextus serves great ends; out of it is born a great empire which will yield great examples. But this is nothing compared with the price of the whole world, the beauty of which you admired, as only after a happy passing from this mortal state to another and a better one, the gods will make you able to understand it.' At this moment Theodore awoke; he thanks the goddess and admits the justice of Jupiter, and filled with what he had seen and heard, he continues the office of high priest with all the zeal of a true servant of his god, and with all the joy of which a mortal is capable."

CHAPTER III.

THE SPIRIT AND CHARACTER OF LEIBNIZ'S PHILOSOPHY.

In the third *éclaircissement* to his 'Nouveau Système,' written in the year 1696, Leibniz introduces the simile of two clocks to express the relation of mind and body. He states that there are three ways in which two clocks may be made to agree perfectly. The first consists in the influence of one clock on the other, the second in the care of some intelligent person who directs them, the third in their own exactness. The first he calls the way of mutual influence, the second that of assistance, the third that of pre-established harmony. The first is the explanation of popular philosophy; the second is that of occasionalism, and makes God a *deus ex machina;* the third is the one which he himself has resorted to. This simile is not more fortunate than the empty chamber or *tabula rasa* of Locke, nor does Leibniz make frequent use of it. Nevertheless it has impressed itself upon the popular mind, and has been continually quoted as characteristic of the views of our philosopher. Let us abandon the letter, and try to grasp the spirit of Leibniz's teaching.

To begin with, Leibniz does not confine himself to an

examination of the relation of mind and body—a favourite problem with the Cartesians and other related schools of philosophy. He grasps the question in a much wider spirit. How can any one thing be conceived to act upon another? It is the great problem of interaction, of the mutual dependence and connection of things. At the time when Leibniz wrote, the mechanical view of nature was being established—a view which in the beginning was only applied to inorganic, or at least only to external things; a view, however, which since has been established as the only true scientific way of dealing with phenomena of any kind, whether organic or inorganic, physical or mental. The use and application of this mechanical mode of dealing with phenomena depends upon the tacit supposition that the things of this world are connected in such a manner that, if at any point a certain change takes place, according to distance in time and space, this change is accompanied or followed by changes in everything else. These other changes may be exceedingly small, they may be practically imperceptible, but the mechanical view cannot be upheld without postulating that the consequences of every event or phenomenon spread through all time and space, so far as these are filled with existing things. It is true that this may not have been sufficiently obvious in the beginning of exact research, and this for a very simple reason. Exact science began by studying phenomena in the same way as mathematicians study figures; it studied them experimentally—viz., in the abstract and isolated, *i.e.*, torn out of the connections in which they stand in time and space. The application to real things and phenomena consisted, then, in making in the abstract result the neces-

sary corrections, and in approaching nature by an infinite number of approximations. Nobody was more fitted than Leibniz to appreciate at once the true nature of the exact method, and to see that scientifically every phenomenon is made up of an infinite number of infinitely small elements, and likewise that every action, considered as a beginning, produces around it a reaction which is divided into an infinite number of parts. Mathematically speaking, every phenomenon is an integral, and can be split up both in its antecedent causes and following effects into a compound of an infinite number of infinitely small occurrences. In Leibniz's mind this truth took the form of the law of continuity. Had he been a mathematician pure and simple, his speculations would probably not have gone beyond the conceptions of differential and integral; his interest would have been limited to the measurement, calculation, and prediction of events and phenomena. But he was a philosopher, and he puts to himself a further question. Allowing that the infinitesimal and exact methods which constitute the mechanical view are correct, how are we to conceive the things of this world to be constituted so as to yield that view? There seems no difficulty in imagining that two things are so connected that a certain change in the one is accompanied by a definite change in the other, but the difficulty is to form a mental representation of what in reality corresponds to the connection which we express in a logical or mathematical formula. Where is it? and what is it? Is it in the things themselves, or is it outside of and between the things? To answer this question we must have recourse to other than the purely mathematical or measurable properties of things. To say that the

connections between the existing things have their source in the things, and only appear to us to be between them, would increase our idea of the importance and value of every single thing. On the other side, to maintain that these connections have their existence outside of the things of this world would be to suppose another kind of reality besides the observable things, to deprive the latter of their independence, to assign to them a merely apparent existence, and to suppose some larger and wider reality which contains and controls them. Both views are logically tenable; the latter found its classical expression in the system of Spinoza.

We now understand at what point Leibniz's individualism stepped in, and decided the question in favour of the independent and individual nature of existing things. It was clearly not his purely mathematical studies which led him to decide in favour of the individualistic hypothesis. It was the peculiar view he took of the mental or thinking process, and further, his dynamical discovery that force was not a thing which was measurable by the quantity of motion, but that it was a something which could disappear and be stored up. The existing things were for Leibniz receptacles of power; they had more than a purely geometrical value and existence. We can express this idea in other words. We can say, the things of this world have not only outward relations, they have an inward life.

Having decided the problem by the individualistic hypothesis, two further questions presented themselves. In what does the inner life of real things consist? How can the apparent connection of things with each other be explained?

The external world having lost for Leibniz its independence and importance, all external connections and phenomena had to be explained as purely mental representations of thinking beings. The principle of life and development was not outside, it was inside the real things of this world; they were all mental beings or monads, capable of endless development, each representing a special phase or stage in this development. And the principle of this development was the thinking process. But although the light of conscious thought was the sun in this inner world, there was a vast unilluminated portion, the realm of unconscious and of indistinct thought, including the perceptions of the senses. And what is the object of this thought? What does it represent? It represents the whole world; it is a reflection of all other monads. This statement is only a translation into the terminology of his own philosophy of the mechanical view of nature. According to this, a change anywhere in the universe affects every part of it. The motion of all the planets is recorded in the perturbations of every one of them. For a sufficiently delicate eye each thing of this world registers in its motion or structural change the events of all other things around it. If everything is considered to be endowed with thought, these changes will be registered in the form of more or less clear ideas, of unconscious feeling, of perceptions, or of clear and transparent thought. For the mechanical view of nature in the same way as for Leibniz, every monad is a mirror of the universe. The difference only is, that for the mechanical view of nature everything reflects like a lifeless mirror, but that for Leibniz every mirror not only reflected but likewise

absorbed the image into its own consciousness, and knew about it.

There remains the second question. If all reality is inside the monads, not external to them or between them, how is the mutual agreement which creates in our minds the semblance of a continued action and reaction to be explained? Not in any other way than the development of our own inner life. This flows on according to the order of thought. The mathematician knows no difference between time and space. The intellectual progress of thought in time is representative of the actual order of things in space. But this order presupposes a thinking subject in which the thought takes place; it is the mind of the Creator, of God. Having once willed to create a world—*i.e.*, a representation in space of the intellectual unity which lives in his mind—there is not required any further adjustment or continued assistance. And this again is merely a translation of the mechanical view of nature. For according to this we consider every phase of existence to be a necessary outcome or evolution of what preceded it, and to bear in it the seed of the future. "Le présent est gros de l'avenir," is the device of the natural philosopher of to-day, as well as of Leibniz. The order once established, there is no cause for disorder. The latter could only spring from some counteracting influence, not foreseen or calculated on in the beginning. It is a human idea to look upon the order of things in any other way than as pre-established. For human beings reckon merely with a portion of the factors of reality; they have at their command only a small fraction of the existing forces. No wonder, then, that they have — in their

narrow sphere—continually to watch and assist, so that their work may not be lost, or the order they have established be destroyed. For the divine Being who, when resolving to create a world, had all its parts and factors, its elements and forces, at His command, there existed no evil influence which could disturb the once-established harmony. The simile of the two clocks is misleading; for there exist, according to Leibniz and according to the mechanical view of nature, no two phenomena exactly alike. No two mirrors reflect the same picture. It is not likeness but harmony and agreement which has to be explained.

Thus the philosophy of Leibniz is a translation of the mechanical view of nature into the language of individualism and intellectualism, with all the theories of development and evolution foreshadowed in it. It is also clear to us now why Leibniz decided on this translation, or remodelling, of the mechanical or mathematical view. It was the firm conviction in his mind that the things of this world had a purpose, an end to serve; that the mechanism of nature had an object; that besides the necessary mathematical relations of things, there were—what the natural philosopher considers to be the examples of the rule—what Leibniz looked upon as the contingent truths, which were selected out of an infinity of possible realities, because they tended to subserve a higher purpose or end. Now the only instance of the end being as it were before, and determining the beginning, is in the process of thought, where the desired result is ideally before the mind of him who selects the ways and means; and where out of many possible beginnings that one is chosen which under the necessary rules of

thought—of the mathematical relations—guarantees the desired end. Is the world, therefore, to be not merely—though wholly—a playground of mechanical laws; is there, besides the necessary, also the actual and contingent; then the latter can only be explained by final, *i.e.*, intellectual causes, and these must have existed in the mind of an intelligent creator. Leibniz's love of regularity led him to the mechanical view of nature; his practical sense, his desire to see a purpose in everything, made him decide for the individualistic solution of the great problem. The former led him to assert the pre-establishment of the existing order and harmony, the maintenance of it according to mechanical laws; the latter led him to the idea that God had created the existing world in preference to any other as the best—*i.e.*, it led to his optimism.

And the spirit which lived in his philosophy dictated all the pursuits and endeavours of his life. Whenever he approaches a scientific problem, or grapples with a practical difficulty, it is with the desire of finding the law and governing principle of things, of penetrating to the root of every question; but, at the same time, with the ultimate object of reconciling apparent contrasts, establishing order, and of resolving in a final chord the dissonances which grated upon his feelings. His philosophy fell as the ripest fruit from the tree of his knowledge and experience; it was not only intellectually conceived but practically applied, it was the *rationale* of his whole thought and life. In order to understand and appreciate this, we must know the philosopher and his varied fortunes. It was not a purely scientific process which worked in Leibniz's mind the firm belief in the

truth of his principles. It was the logic of facts and of practice. The manifold ways in which he explained his views to others, the elaborate defences of his principles, and the ever-varying light which he threw upon them in his correspondences and controversies, were afterthoughts. They were an attempt to say what he meant and felt to be true, but they do not exhibit the trains of thought—conscious or unconscious, clear or indistinct—which in the vicissitudes of his life and studies had led him up to them. His philosophy was, like the *petites perceptions* which he discovered in the human mind, hidden in the storehouse of his soul; it formed the dark, half-illuminated background of all his thoughts, his inventions, his aspirations, and his endeavours. Out of this chiaro-oscuro he would bring to light the wonderful glimpses of truth which pervade all his writings, the far-reaching suggestions which he threw out for future research. In it lay hidden, or half visible only, the principles which since his time have been distinctly proclaimed and profitably used—in mathematics and physics, in law and history, in abstract and applied science.

The philosophy of Leibniz has frequently been called eclectic, and this term does not incorrectly describe the attitude which Leibniz assumed to other systems of philosophy, both ancient and modern, and his declaration that he found in them generally more to approve of than to condemn. We need not state, however, that the name eclectic, in so far as it implies a want of originality, is entirely misapplied. It was natural for Leibniz to look upon every system as a reflection of the whole truth, as a partial and one-sided expression of it; and it was equally consistent that his love of harmony and order made him

anxious to reconcile his own views with those of other thinkers. In other respects, his philosophy was the very opposite of that which has been characteristic of the eclectics of ancient and modern times—viz., the disinclination to go to the root of questions, and the desire to collect just so much philosophical thought as might suffice to grapple superficially with the immediate problems of the day, and with the questions of practical life. Nothing was more foreign to Leibniz than this tendency—merely to work and care for the wants of the moment. His fault lay rather in being too abstract, in looking at every question from too far-reaching and too fundamental a point of view, and in not contenting himself with cultivating the narrower but safer fields of research. If the position of the eclectic philosopher is essentially retrospective, that of Leibniz was essentially prospective. His philosophy heralded a new era and a new culture, and has probably lived longer in its influence than any other except that of Aristotle.

For Leibniz was the first to see clearly—what was indeed foreshadowed in the doctrines of that greatest thinker of antiquity — how the progress of human thought had led to an inevitable dualism, and how the task of the philosopher would henceforward be, to reconcile the two possible aspects which the world presented to the thinking mind. He saw clearly that the ever-recurring difficulty was to find the unity in apparent contradictions, the harmony of seemingly opposed theories. The philosophy of the Greeks had come to an end when the unity of nature and thought, of mind and matter, of knowledge and virtue, had vanished for the philosopher,—when the world seemed split into two

halves, and the processes of thought had been correspondingly divided into those of inductive and deductive reasoning. The revival of learning in the modern world had led to two opposite systems, each of which aspired to give a new wisdom in the place of that which was old and obsolete. The one recommended observation and inductive reasoning, the other abstraction and deductive reasoning; the one believed in the truth of the senses, the other in that of self-evident thought. The one began with multiplicity, and hoped to find the unity of thought; the other began with unity, and tried to find a way into the multiplicity of phenomena. But neither Bacon nor Descartes could carry through their arguments consistently. And yet it was evident that both had done much that was new and valuable. Leibniz was the first modern thinker who recognised this. Educated in the spirit of ancient thought, accustomed to believe in that unity which was the soul of Plato's wisdom, coming from a country which had not yet committed itself to either of the two schools, Leibniz could impartially survey the position and define a new task for the philosophy of the future. It was not a philosophy of fruit and progress which he aimed at in the highest instance, nor a knowledge, certain and self-evident in itself. Though he admired and recommended both, it was a reconciliation of the two at which he aimed—a union of the mechanical and teleological views, of the inductive and deductive processes, of observation and theory, of final and efficient causes, of reason and faith. Philosophy henceforward did not mean what it had meant in antiquity, the knowledge of all divine and human things. It had not to find new rules for the conduct of life and

the regulation of society; this had been done whilst philosophical thought slumbered in the vast but half-buried system of Aristotle, by the force of practical faith. Nor had it to discover the way to knowledge; this had been found and trodden by the great pioneers of modern science. But the very fact that two forces had occupied the field which originally was occupied by one, that two agencies were independently at work, defined a new task for the contemplative mind. Wisdom should henceforward mean to lead the two forces together—to combine both agencies, not to despise or to overrate either; to look to that which is minute, but not to forget that which is great; to work out theories, but not to neglect their application; to stimulate scientific research, but not to rest satisfied with it; to calculate and predict phenomena, but also to understand and interpret them; to be precise and strict in the path of exact thought, but likewise to be elevated and boundless in faith and sympathy.

If this is the spirit in which Leibniz conceived the task which was set before the modern philosopher, it is interesting to examine to what extent he himself realised it, and how he succeeded in impressing his generation with it. The first question refers to the character of his philosophy, the latter to its fate. The former is dependent on the person and character of the author, the latter upon the age and country for which he wrote. Both are tolerably familiar to us. Let us see what were their respective influences.

In our review of Leibniz's character we had to deplore the absence of that warmth and enthusiasm which give colour and unity to life and its labours, without which the most honest endeavours and the most splendid abili-

ties lack a worthy object and purpose, and appear frequently wasted or scattered in lifelong search. We have also noted to what extent outward circumstances tended to relieve Leibniz of that painful necessity of concentration, which might have forced him to gather his whole energy and thought to one focus, from which a ray of intenser and purer light would have emanated. We shall now trace a similar want in his philosophy. We shall see the reason why he who strove unceasingly for harmony, found, after all, no uniting idea, in which to collect the leading thoughts of his life, and bind them together; how all his work remained as it were preparatory and suggestive, a compromise rather than a solution of the difficulty. Nor is it superfluous to define more closely the different points of his teaching, where this defect is most clearly visible. There is hardly any problem of modern thought which Leibniz did not approach, and in the treatment of which he has not, to some extent, led the way; but in almost every case we feel the want of a something of which his soul seemed to have no grasp, and for which his system had no place.

It was the poetical, the emotional, the artistic element. Not that this was altogether foreign to our philosopher, who loved the sacred poetry of Luther and others, and wrote himself in 1684 a hymn worthy to be included in any collection. But the emotional and poetic element was but slightly recognised in his philosophical doctrine, as it certainly played an inferior part in the affairs of his life. Let us see what he says about art. The few passages referring to this subject in his unpublished manuscripts,[1] in his correspondence, and in the 'Principes de la nature

[1] Quoted by Guhrauer.

et de la grace,' belonging to the year 1714, amount to this, that he considered the pleasurable sensation of the Beautiful to be owing to an unclear perception of order and harmony, the undefined consciousness of a perfection which cannot be clearly understood. Thus the region of the Beautiful, of poetry and art, lies according to Leibniz on the borderland of the unconscious and conscious—it lies in the twilight of the perceiving and sentient soul. The great world of the *petites perceptions*, the half-illuminated storehouse of our mind, where the ideas hover when they merge out of darkness into full light—this is the home of the Beautiful.

Nothing could be more suggestive than this. Leibniz, however, has not dwelt on this idea with his usual fulness. Had he done so, he might have detected the great defect of his system, and his speculations might have taken a course which it was reserved for more modern thinkers to pursue.

But we anticipate what the last chapter will have to trace, at least in outline. At present, where our object is to express as concisely as possible the character of Leibniz's philosophy, the foregoing remark reminds us that the religious and emotional element did not fare much better under his treatment than the poetical. And the same excuse for meagreness which we might have mentioned in the other, could not be advanced in this instance—viz., that Leibniz lived in an age which was barren in poetical and artistic production. For religious questions attracted, as we have seen, the greatest possible attention, and formed a topic of unceasing interest to Leibniz. So much more remarkable is it to find how one-sided were the considerations which they

received at his hand. This one-sidedness is not difficult to explain. Though in his youth Leibniz was enlightened by a spark of genuine religious feeling, the controversies of the Churches, and the purely dogmatical and political turn which religious life had taken, especially in the higher circles of society, had gone far to extinguish it, forcing the external side of religious life into undue prominence. They had led to that purely intellectual and doctrinal treatment which deals only with the external shell, but leaves or loses the kernel. It is an entire misconception of the whole subject to discuss articles of faith or truths of religion as co-ordinate with those of science and reason. The latter have ever only awkwardly lent their vocabulary and definitions to a true description of religious experience. Wherever faith has lived in a human soul, or manifested itself in human action, it has done so as a leading principle, an all-absorbing emotion, an indefinable trust and devotion. It was what Leibniz describes correctly when he says :[1] "Mais la grace interne du S. Esprit y (viz., le motif de probabilité) supplie immédiatement d'une manière surnaturelle, et c'est ce qui fait ce que les théologiens appellent proprement une foi divine." But further on he also says : "Les dissensions de ces gens entr'eux les duroit encore convaincre que leur prétendu *témoignage interne* n'est point divin ;" and reports that William Penn had tried, on his journey to Germany, to bring about a kind of understanding between those who trust to this inner testimony, but that he had not succeeded. The task of the philosopher is to acknowledge the existence of religion and faith as a mental phenomenon, and, instead of

[1] Nouveaux Essais, vol. iv. p. 1

analysing its supposed contents and teachings, and distilling them into logical forms, rather to put the question, What conception have we to form of the human mind which is capable of interpreting and explaining the existence of this mysterious province, without depriving it of its spontaneous and original character? Here again the doctrine of Leibniz, of the *petites perceptions* of the infinite and half-illuminated storehouse of the human mind, was most suggestive; but he has passed it by, as in the case of the poetical faculty, allured by what to him, as to many after him, has proved to be after all a misleading ideal.

This ideal was the translation of everything into a logical process of thought—considering this as the most perfect of mental operations, and as the ripest fruit of individual development. For Leibniz it was the clear daylight of the mind, compared with which the perceptions of the senses, the emotions and feelings, were preparatory, inferior, and shadowy. Dazzled, as he must have been, by the wonderful revolution which the application of purely analytical reasoning had worked in the exploration of Nature, he saw no limit to the development of the mathematical methods, no end to the increase of knowledge, which might be expected from their use. And as he stood himself in the midst of this new and promising field of research, surrounded by problems which taxed even his powers, he might very easily overrate the real value of the purely formal processes which he handled with so much success. Thus it happened that, in his and many of the following systems of philosophy, the real character of the thinking process was overlooked or forgotten,—the fact that it is power-

less to create its objects, that it consists merely in referring or comparing, in dividing or combining, the material which is supplied to it by other faculties of the mind. And these other faculties are not merely the observing and perceiving senses, but quite as much the sensations of pleasure and pain, and the emotions of reverence, admiration, and awe, which give to our inward life its warmth and colour.

And yet this apotheosis of logical method had its excellence as well as its defects; and it had it in common with the contemporary school of philosophy, which dates in England from Locke's celebrated essay. The desire to bring definiteness and clearness into the confused mass of half-scientific reasoning, to expose the futility and shallowness of popular sentimentalism, or the hollowness of antiquated phrases, was certainly a healthy feature in that system, which was destined to herald a new phase of culture. This side of Leibniz's philosophy marks its moral strength. It strove, above all, after exact knowledge or scientific truth; and in temporarily overlooking or underrating the realm of fancy or the region of the emotions—the domains of the beautiful and the holy—it fortified its position by the metaphysical doctrine, that the existing and intelligible world was the best. The scientific optimist had no need to call into play the creative powers of imagination, or to appeal for consolation to a gloomy religion, in order to reconcile himself with his task in the existing world, which, chosen by the divine Being among an infinity of others, had the approval of His supreme intelligence, and was the field for our work and our efforts.

Whatever the defects of Leibniz's philosophy may have

been, we must repeat that he did not work out his ideas systematically—that he merely established certain beginnings or principles, and left some hints as to how these principles might be employed in the solution of the leading philosophical problems of his day. Besides this, he has been fruitful in suggestions in almost every direction; and even where his ideas meet least with our approval, or appear more than usually strained or inadequate, we are able to detect some half-hidden view, which affords an outlook on a new track of thought, and calls for more careful attention. If ever a philosopher took an impartial survey of the whole field of human thought and action—of opposing theories, and of endeavours which had to each other no friendly feeling, but which were essential and useful factors, notwithstanding, in the aggregate of human culture,—it was Leibniz; if ever a thinker strove to comprehend the work of others, and lead divergent courses of thought to a common end, encouraging every suggestion, gratefully receiving every hint, trying throughout to stimulate rather than oppose or oppress, it was he. He saw an individuality in everything; he believed in the ultimate and fundamental harmony of all things; he worked most persistently in preparing instruments and methods for facilitating and simplifying research, and—in the gloomiest period of his country's history, and in a world full of deception, ruin, and wretchedness—threw broadcast the seeds of new life, and had courage to preach the "doctrine of the best world."

Thus it is that he marks a centre of thought, from which numerous new tracks emanate, rather than that he summed up the work of others, or drew the conclu-

sions of the many scattered tendencies of European culture. He lived in the infancy of the modern world with his eye always looking onward. Instead of leading to some final result, to some crowning and all-absorbing idea, the monument of Leibniz's genius, our brief narrative, to be just to its subject, must end with a glance on a wide and boundless country, with fertilising streams losing themselves in the distance, all of which had their source in him as their fountain-head.

CHAPTER IV.

THE FATE OF LEIBNIZ'S PHILOSOPHY.

ENOUGH has been said, even in this brief sketch of Leibniz's life and work, to impress the reader with a special difficulty which stands in the way of a just appreciation of his merits. It is the fragmentary nature of all his writings. This difficulty existed to a still greater extent for his contemporaries and immediate successors. The first edition of his works —including a large amount of correspondence—was published by Dutens in the year 1768, more than fifty years after his death. A few years earlier, Raspe had published some of Leibniz's posthumous writings, including the 'Nouveaux Essais.' Of the 101 pieces contained in Erdmann's edition from the year 1840, nearly one-fourth had not been published before, and many had been included in various inaccessible collections. It was therefore only natural that, very soon after the death of Leibniz, the want of a more concise and comprehensive statement of his philosophical opinions should be felt. A collection of his scattered publications and his correspondence, though this was repeatedly attempted, was as little satisfactory as a mere summary

of biographical detail. What was wanted was an arrangement and exposition of his opinions according to the usual systematic form of philosophical writing; in short, a systematisation of Leibniz's philosophy. It is well known that this work was undertaken—though in rather a doubtful spirit—by Christian Wolff (1679-1754), whose correspondence with Leibniz[1] (during the years 1704-1716) should be read in order to gain a correct idea of their mutual relation. Wolff was professor of mathematics and philosophy, and his aim was naturally to put his ideas in such a shape and form, that they could be taught and logically strung together according to some readily intelligible scheme. On entering upon a study of his writings, however, we are at once met with a formalism and pedantry which is alike fatiguing and unnecessary. Wolff has in abundance that which is wanting in Leibniz—viz., divisions and definitions; but he lacks the suggestiveness and depth which characterised his master. Everything is to be clear, if not easy, and in consequence it becomes shallow and trivial. It would be difficult to understand how Wolff attained to the position and influence he possessed, were it not for the fact that he was one of the first who wrote and lectured in the German tongue, and thus addressed a circle of readers to whom Leibniz's philosophical writings were inaccessible. He also introduced philosophy more completely into the university calendars, and subdivided the subject into a variety of departments, all of which retained the names selected or invented by Wolff, almost to the present day. Being

[1] See the seventh volume of Leibniz's Mathematical Works by Gerhardt.

a philosopher by profession, and deficient in that general knowledge of the world and culture which is so great a characteristic in Leibniz, his expositions lack the charm of style, the happy illustrations, the personal element, the universal sympathy and interest which we find in Leibniz.

It was evident that the spirit of Leibniz's philosophy would hardly survive the treatment of an expounder so uncongenial, who, though much indebted to Leibniz, was displeased when his friend Georg Bernhard Bilfinger invented, and gave currency to, the joint name of the Leibniz-Wolffian philosophy. Leibniz had not given a formal definition of the word philosophy; but we know enough of it now to see how false a position philosophy assumed under the definition of Wolff as "cognitio rationis eorum, quæ sunt vel fiunt, unde intelligatur, cur sint vel fiant," or as the "scientia possibilium quatenus esse possunt." This definition of philosophy is too wide, —it makes φιλοσοφία synonymous with ἐπιστήμη: it neither tells us how philosophy differs from other mental pursuits, nor does it recognise the novel attitude which philosophy had assumed to science and practical life in the modern world.[1] With Wolff, philosophy had ceased to be wisdom, but it necessarily came into conflict with the sciences by establishing a kind of *a priori* knowledge, independent of that gained by the exact methods of observation and calculation. This was all quite contrary to the spirit of Leibniz's teaching, though in the details of his opinions there were certain points which might lead to a doctrine so one-sided and erroneous.

[1] See Ueberweg's remarks in his History of Philosophy, vol. i., introduction.

Leibniz had taught that there existed not only necessary but also contingent truths; that in the mathematical laws of nature the contingent, *i.e.*, the actual, did not find a sufficient explanation. The explanation of this had to be sought in the purpose and end of things, in the final causes. It was a plausible development of this doctrine to establish a "rational" as well as an empirical and mathematical method. This "rational" method should give "rational" knowledge, it should discover the ratio or reason of things. There were, however, two great dangers in this attempt. Except when limited to mere general suggestions or leading principles which were rooted in a deeper religious and moral consciousness, this rational knowledge would necessarily—for want of a definite method and beginning—consist in the mere repetition of vague and undefined conceptions, which would tend to make it ridiculous and commonplace. Or it would undertake to demonstrate seriously that which is not demonstrable, to make intelligible that which is above reason, and would in so doing lead to rationalism. Both of these were consequences of Leibniz's teaching, if it were taken according to the letter and not supported by its spirit. And thus it came to pass that, under the hands of its first follower, the sublime and elevated ideas of Leibniz led to a popular commonplace philosophy and an empty rationalism. As such it became widely spread, and was the characteristic feature of a certain phase of German culture and literature in the last century, now well known—also in England—under the name of "Aufklärung." From another point of view this rationalising tendency could claim a support from Leibniz's own teaching. He had placed clear logical

thought at the top of the different mental processes, and had defined perception and feeling as the lower and indistinct stages of the life of the monad; he had emphasised the logical form as the more perfect and more adequate expression of the inward life, that which was expressive of the full daylight and consciousness. It was therefore to some extent suggested by Leibniz that it was a worthy object of philosophy to make everything clear and plain and reasonable, and the many "vernünftige Gedanken" of Wolff could, with some justice, claim his parentage. Thus the first attempt to systematise Leibniz's ideas, and to convert them into a subject of university instruction, tended at once to popularise his philosophy, and also to lay it open to the attacks of criticism, and of those who cultivated the wide and fruitful fields of experience.

Happily this was not the only fruit of the new culture. Freed from the letter, the spirit of Leibniz was destined to survive independently, and pour its fertilising current into quite a different course. Hardly any of the principles of Leibniz's philosophy, as they are familiar to us, had entered into the combination of the Leibniz-Wolffian philosophy; his law of continuity, his doctrine of universal harmony, his ideas of development and individuality, had all been deprived of their deeper meaning, if they had not been discarded altogether. It was in the extra-academic literature of Germany, which sprang up spontaneously, without special connection with any of the existing systems or schools, but influenced by them all—both German and foreign, ancient and modern—that those germs of new life found a congenial soil for their growth. Two men, more than

their many other friends and allies, stand out as true heirs to the spirit of Leibniz; Lessing (1729-1781) and Herder (1744-1803). They both had this in common with Leibniz, that they were not philosophers by profession—that their philosophy was a spontaneous outcome of their extensive studies, their peculiar thought, and their wide culture. Neither of them stood in any conscious historical connection with Leibniz, and they are to be looked upon as links in the continuous chain of thought, which connects the present with the past, quite as much through that which they added to Leibniz's thought, as through that which they received from him. Each of them was great in a special direction in which Leibniz was deficient, and by adding a peculiar and novel element each stands out as typical of a special phase of culture. It will increase our knowledge of Leibniz's philosophy if we advert, for a little, to this subject.

In spite of the many controversies in which Leibniz was entangled, it does not appear as if he had been really victorious in any one of them. Many of his antagonists did not think it necessary to reply to his remarks, others broke off the lengthened discussions, at times the death of the controversialist brought the undecided argument to an end. Thus not only the personal quarrel about the infinitesimal calculus remained without distinct issue, but Leibniz's arguments with Arnaud, Bossuet, Locke, Clarke, Bayle, and many others, led to no decided victory. The cause of this may have been to some extent the desire of Leibniz to accommodate himself as much as possible to the opinions of others, in which he always saw some truth.

This led him to conduct his controversies rather with the object of defending his own opinions than refuting those of his antagonist. It cannot be denied, however, that Leibniz was deficient in that precision of thought and expression, in that logical acumen and terseness of style, which characterises the critic. He was deficient in critical ability, which was exactly the point in which Lessing excelled. Both Leibniz and Lessing had at their command remarkable erudition; but whilst Leibniz used it mostly in the way of illustration, Lessing used it in the spirit of philological criticism; and whilst Leibniz often fatigues us by straying from his subject, Lessing always clings tenaciously to it, and says neither more nor less than is absolutely necessary. Leibniz was a great teacher of method, but his was the mathematical, calculating method. Lessing's method was different,—it had been gained in the study of the ancient classics and the great masters of modern philology, in the criticism of historical evidence, of words and of texts. And if Leibniz's general culture was that of a philosophical mathematician, Lessing's was that of a philosophical historian and critic. Lessing embraced Leibniz's ideas of continuity and harmony, as well as of the human mind, as the microcosm in the macrocosm, but he applied them principally to history, in which he traces that development which Leibniz upheld metaphysically and in the abstract. Lessing, and his contemporary Winckelmann, were among the first to spread that spirit of sympathetic and loving appreciation of the past, especially of the ancient classical world, the peculiar culture of which they tried to understand and portray by a careful and critically accurate study of

detail. In the hands of Lessing the ideas of development and of individuality in historical life gave a vast field for patient research, which since his time has engrossed many faithful workers, who, as little as Lessing, have found time or taste to pronounce a decided opinion on the ultimate metaphysical principles, from which in Leibniz those ideas emanated, or on the conclusions to which in his system they led. Contented to possess those canons of historical research, they have, as a whole, imitated Leibniz in this respect, that they have put aside the systematisation of their opinions. In many cases they have expressed a decided aversion to the systematising tendency, which, in the philosophy of the schools, had grown to an excess; but they have nevertheless, without exception, inherited the true spirit of Leibniz, for whom many of them have expressed their profoundest admiration.

Lessing said, that if Leibniz had wished to enunciate a system, it would not have been that of Wolff. Still less does Herder relish the Leibniz-Wolffian philosophy. In the year 1776 he wrote in the 'German Mercury'[1]—

"Leibniz loved to make comparisons, to make novel use of other men's ideas, and frequently to couple the most contradictory opinions: thus he revealed his whole system not otherwise than as it presented itself to him, as it lived in his soul, in glimpses of wit and imagination, in short essays, and in ever familiarising us with other men's ideas. It had to be felt in the warmth of this origin and of this connection, otherwise Leibniz's spirit was gone, and with it all original and primitive truth of the impression. Wolff, who was incapable of feeling this, or who as follower and

[1] See Herder's Postscenien zur Geschichte der Menschheit.

commentator had no time for feeling, made theorems out of these prospects and glimpses of wit. They were so much easier to demonstrate, as they had lost their spontaneousness, and had become trivial, and might mean everything or nothing. The followers of this school-dissector dissected further: the Germanised Latin language of philosophy stood there as a tree on which caterpillars and beetles had left on each leaf a metaphysic of dry threads, so that the dryad wept for mercy—Leibniz, Leibniz! where was thy spirit?"

If Wolff had been tempted by Leibniz's logical tendency to convert his philosophy into mere form, Herder was tempted by the very opposite. He was tempted to look for the "original and primitive touch of the impression." He had not, like Lessing, imbibed the love of clearness, conciseness, and transparency; but he had, in common with Lessing, the historical interest. If Lessing studied the perfect models of ancient and modern art, and strove for the daylight of clear conceptions, using the precise methods of modern criticism, Herder, on the contrary, loved the elemental, the boundless, the half-developed; he searched for beginnings of thought in the prehistoric ages, and in the popular songs of all nations. In this spirit he wrote his works on the 'Philosophy of History,' in which—in the true Leibnizian spirit—he traces the position and development of man, the microcosm, in the world, the macrocosm. And whilst Lessing was the first to make his nation admire Shakespeare, the model and perfection of modern poetry, Herder referred always to Homer, and published his 'Voices of the People,' in which he collected and translated the popular songs of all nations, the beginnings of poetical production. Lessing loved the sunlight of the perfectly unfolded life of the monad—to use the Leib-

nizian term; Herder loved to lose himself in the chiaro-oscuro of the *petites perceptions* of the half-conscious background of the soul. Neither Lessing nor Herder was a great poet, but each in his way had the greatest influence on the classical poets of Germany.[1]

As an unsystematic philosopher, Herder did more than any other to point out the importance and truth of those factors of mental life which had been suggested but neglected, or considered as of secondary value, by Leibniz—the poetical and religious, the world of the imagination and the feelings. Among the followers of Leibniz who stand outside of systematic thought and the doctrine of the schools, Herder marks quite as important an influence in the further history and development of speculative thought as was exerted in an opposite direction by the mechanical philosophy of the mathematical and exact sciences, which equally date their extensive culture in Germany from the impetus given by Leibniz.

But before we show in outline how these three courses of thought which sprang from the fountain-head of Leibniz's thought—viz., the systematic philosophy of the schools, the mechanical of the sciences, and the poetical philosophy of general literature — have been brought together in recent times, we must refer briefly to two distinct currents of thought, which had their origin outside of the philosophy we have been studying. These two currents have to be separately traced to Locke and the English philosophy on the one side, and to Spinoza on the other.

[1] See the masterly comparison of Lessing and Herder in the fourth volume of Gervinus's Geschichte der deutschen Dichtung.

The 'Nouveaux Essais' of Leibniz, written as an examination of Locke's 'Essay concerning Human Understanding,' mark the great difference between Locke's and Leibniz's theories of knowledge; but in the short 'Reflections' belonging to the year 1696, the latter had already classically expressed his objections to the whole plan of Locke's inquiry. These objections were, however, little noticed at the time, the result of the two opposite theories being of more interest—*i.e.*, the opinions which Locke and Leibniz respectively formed as to the nature of the human mind. The writings of Locke were soon translated into French, and they exercised a great influence, through Condillac, on Continental thought, and also on the philosophy of the German "Aufklärung." Those representatives of this great movement who felt themselves repelled by the systematic dryness and inelegance of Wolff, admired and imitated the clear and simple style of Locke, and that of his French followers and commentators. And not only Locke, but all the classical English writers of the eighteenth century, both in prose and poetry, such as Pope, Shaftesbury, Defoe, Young, Thomson, and Gray, were eagerly read, translated, and imitated by the chief German writers of the age. It was Lessing and Herder, the heirs of Leibniz's genius, who desired something deeper than the thought of the eighteenth century, and taught their countrymen to admire the neglected masters.

Let us see what Herder says[1] about English philosophy as introduced into Germany by the votaries of "Aufklärung."

[1] Same passage as quoted p. 198.

"About this time a philosophy crept in from England, which in its spirit was truly a mechanical philosophy, or, as it calls itself, a philosophy of common sense. It is well known that the Britons in their manufactories subdivide work,—that one makes watch-springs, another watch-cases, &c., thus forwarding the art by their narrower application. Thus also some of their philosophers have been pleased to divide their subject, to elaborate a single part with all the mechanical industry of a weaver, &c.; and as this produced excellent works on isolated questions, so necessarily the general field remained rather empty. This was filled—as the Chinese fill the corners of their maps with nutshells—with 'good reason,' 'common sense,' 'moral sentiment,' 'correct notions,' and the like. . . . These came to Germany at the moment when she had had enough of Wolffian philosophy and of the Moravians; and then it was very convenient for some idle persons, who could neither think nor feel properly, to adopt these works, to set them up as standards, and under them to—reform."

This passage would give an erroneous idea of Herder's discriminating power, without the further remark that he did not count Bishop Berkeley among the English philosophers whom he mentions above. He classes him with Leibniz and Spinoza, calls his system Immaterialism, not Idealism, and defends him against Kant's criticism.[1]

[1] See Herder's Metakritik, chap. vi., first book, "On Idealism and Realism," the following passage: "We do wrong to this earnest and refined thinker if we look at his system as a puzzle, or if we place it in opposition to Realism. The ideas which he considers as existing in the everlasting mind, and as represented in his own mind, were to him the most real ideas, which he repeatedly opposes with great force and truth to the empty fictions and abstractions of language. He is an enemy only to that nonentity, "dead matter," which is supposed to act as a lifeless thing, and, itself without ideas, is supposed to give ideas; it he banishes from philosophy as a contradiction, and from creation as a nonentity."

It is well known how the English philosophy of Locke and his followers was destined afterwards to receive in Germany quite a different treatment from that which the philosophers of the "Aufklärung" bestowed upon it, and this by a thinker who had been trained in the metaphysics of the Wolffian school, and had been roused from his metaphysical dream by the freshness of Locke and Hume. This thinker was Kant. Except that he was a mathematician, though without originality, there was no resemblance between Kant and Leibniz; and it is not certain that Kant was intimately acquainted with Leibniz at first hand, for he nearly always refers to him jointly with Wolff. It is quite outside of our purpose to estimate the value of Kant's speculations, which mark a crisis in philosophy. It seems almost inevitable that this crisis should be passed through by thinkers of the most differing schools; and to judge by the extensive literature which has recently appeared in England on the subject, it may safely be said that the importance of Kant is certainly not any longer underestimated. The question which interests us here is mainly this: How did the deeper current of thought emanating from Leibniz fare under the influence of that remarkable crisis?

In one way the philosophy of Kant formed a contrast to that of Leibniz. This contrast is characterised, on the side of Leibniz, by one of the objections which he expressed in the year 1696 to Locke's method, and which can be shortly stated in more modern language as follows: A theory of Knowing, as an introduction to philosophy, and with the purpose of deciding on the competence of our processes of thought, is impossible. Such a

theory can only follow later on in the course of our philosophical investigations, when certain criteria or standards for deciding such a question have been reached. This contrast was certainly emphasised by Kant himself, who, to distinguish his philosophy from all earlier schools, specially invented a nomenclature. He placed his own as the critical philosophy in opposition to the preceding schools, which he divided into dogmatism and scepticism. These he defined as follows: "By dogmatism in metaphysics we understand the general confidence in its principles without a previous criticism of the faculty of reason itself, merely on account of its success; and by scepticism, the general diffidence in reason which we entertain without previous criticism, merely on account of the failure of its assertions."[1] By the followers of Kant the philosophy of Leibniz was thus classed among the obsolete school of dogmatism.

This contrast referred, however, more to the method and form of philosophy. In the result and general spirit there was more agreement than might superficially appear. For, in reality, the critical philosophy was much more than a mere investigation regarding the powers and competence of human reason, and though professedly undertaken for a purpose similar to that which Locke had before him, the investigations of Kant were conducted by very different means. Philosophy lost in Kant the broad psychological foundation on which it had been built up by Locke, Hume, and their followers, and it assumed the Continental form of a purely logical and metaphysical inquiry. Thus it was that a tendency, which we have had repeated occasion to

[1] See Kant's reply to Eberhard, from the year 1790.

observe in the writings of Leibniz, received a more definite expression in the apparently antagonistic philosophy of Kant. Observation, reflection, and abstraction were for Kant not the only processes which were at the command of the philosopher, nor were the results gained through them final for him. Phenomena—be they external or internal—had to be made thinkable and intelligible—*i.e.*, our conceptions regarding them had to be made thoroughly consistent and clear; and if they were not so, they had to be altered and remodelled, in order to attain this consistency and clearness. Thus—for instance—if the inquiries of Locke and Hume resulted in this, that experience as based upon reasoning, according to the law of cause and effect, was logically unaccountable, there remained in the human mind a contradiction. On the one side, the philosopher said: I cannot satisfactorily account for the mental conviction that there exists between phenomena the necessary connection of cause and effect. On the other side, common-sense said: There does exist between phenomena a necessary connection—viz., that of cause and effect. Kant took up a third and apparently novel position. Allowing this contradiction between common-sense and philosophy, what does it teach us? how have we to reform our conceptions of the observing and reasoning processes, so that it may be intelligible to us why the notion of cause and effect cannot be accounted for by mere observation and reflection, but is nevertheless for us a necessary mode of thinking? When the phenomena of planetary motion could not be accounted for by taking the popular view—viz., that the earth is stationary—Copernicus proposed to remodel the popular view, and to assume that the sun was stationary. Kant

has himself compared his reform in philosophy to that of Copernicus in astronomy. The peculiar form which his inquiry took is of no interest to us at present. It is sufficient to notice two points in which Kant, perhaps unconsciously, took up the same position as Leibniz had done. It was clearly a deeper grasp of the meaning of experience which urged Kant to regard not merely the aggregate of impressions and reflections, but likewise the nature, the habits, and tendencies of the human mind, as equally important phenomena, which must be regarded by the philosopher. And it was, secondly, a consciousness of apparent contradictions—of the dualism of opinions, of conflicting evidence — which produced the desire to harmonise and to effect a reconciliation. In a more methodical and scholarly manner, Kant recognised — as did Leibniz before him—that the great task of modern philosophy,—which is not a province of science,—was to bring order and harmony into the conflicting evidence of the separate sciences and the demands of practical life.

It was to be expected that the great current of thought which sprang from the fountain-head in Leibniz would gain much in precision and purpose by passing through the ordeal of Kant's Critique. That German philosophy did not specially apply itself, however, to a solution of the more modest tasks which both Leibniz and Kant have assigned to it, may be attributed to a variety of reasons, the more important of which are the following :—

The last hundred years have witnessed, in all European countries, a great reform of ideas, and in consequence the growth of a new literature. It would be a worthy task to examine which were in each country the

characteristic national features of this new life. In Germany, which at present alone interests us, the new life unfolded itself under the prominent—though not the sole—influence of classical learning, classical poetry, and classical art. The classical taste was the earlier, and by far the most powerful evidence that a new era had dawned. For those who aspired in thought or fancy to liberate themselves from the trammels of a miserable and crushed national existence, who looked for an ideal liberty where the real could not be had, who felt an aversion to that corporate action which had neither scope nor opportunity—the classical world, with its heroic personages, its self-reliant sages, its ideal of educating the individual into a complete work of art, of the unity of the beautiful and the good, had a peculiar fascination. It suited and nursed the feeling of solitariness, which must have come over great minds in that world of decay and wretchedness. This independence, this classical majesty and self-reliance, was not a feature of Leibniz's philosophy, with its accommodating tendencies, with its compromises and its eclecticism, with its want of unity and of completeness. But it was the main and distinguishing feature of the philosophy of Spinoza.[1] Thus, with all their appreciation of Leibniz, the early representatives of the German renaissance, Lessing and Herder, combined an equal admiration for Spinoza; and Goethe, though averse to the mathematical methods, and never a serious student of any system, confessed himself deeply influenced by Spinoza.

The spirit of Spinoza's philosophy, as opposed to that

[1] See Spinoza's Tractatus Politicus, cap. i. § 6: "Animi libertas seu fortitudo privata virtus est; ut imperii virtus securitas."

of Leibniz, decided the development of modern German philosophy, as soon as the result of Kant's criticism became more generally known, and when it was felt that the desired reconciliation of opposing ideas had either not been actually given or only placed in a shadowy distance. For very different reasons, Kant's philosophy called for greater systematisation and unification, in the same way as Leibniz's philosophy had done. Meanwhile, however, through the unsystematic thought of its poetical literature, the German mind had become familiar with the monistic doctrine of Spinoza, with its lofty spirit of independence, and with its rigorous mathematical method. The temptation was too great not to apply a similar process to the solution of the problems left by Kant. Both Fichte and Schelling came early under the influence of Spinoza, and of those writers who had revived the study of that forgotten and neglected thinker. The result only could prove to what extent this most tempting and fascinating of all enterprises could really satisfy the speculative wants of the human mind.

In looking upon Spinozism as a principle foreign or opposed to the spirit of Leibniz's philosophy, we must not overlook the evident points of resemblance, as well as the deepening influence which the former has exerted on speculative thought. We do not intend to refer to the theological character of Spinoza's system—to its pantheism. What we have in view is the attempt, which culminated in the system of Hegel, to give objective or absolute knowledge—to discover a logical principle expressive of the central life and power inherent in all existing things. This attempt, futile as it appears

to many in the present day, but which nevertheless was pursued and applauded with almost inconceivable enthusiasm, was not quite unsupported by Leibniz's philosophy itself.

We refer here to that side of Leibniz's philosophy already alluded to—viz., the doctrine that clear and logical thought was the highest stage of mental life, compared with which perceiving and feeling were merely subordinate or preparatory processes. Hence the desire to sublime everything into pure thought—to intellectualise and rationalise. If the trivialities of Wolff's school, and the platitudes of the popular philosophy of the "Aufklärung," could to some extent be fathered on Leibniz, it was a natural outcome of this view, that every suggestion by which the logical process of thought could be deepened and elevated without losing its clearness and strictness, was eagerly grasped. Something had been done in this direction by Kant, when he distinguished between reason and understanding, defining the former as the higher faculty and the home of the ideas, by which unity is brought into the rules of the understanding. In the further development of philosophy by Fichte, Schelling, and Hegel, this desire to attain to a higher knowledge—to reach by thought the central unity of everything,—to show not merely the mathematical or mechanical connections, but to attain to some insight into the meaning or reason of things (to deal with what Leibniz termed the "contingent"),—played a prominent part. Nor was it likely that anything but the actual result would permit of a final judgment as to how far these aspirations could be satisfied by philosophical thought.

In the course of these speculations, which finally strayed far away from the task which Leibniz had set to philosophy, one idea more than any other shows the inherent defect of that great thinker's teaching, and points out the direction in which an advance upon him is possible. This idea, of which Schelling may be considered the principal though by no means the only exponent, was an outcome of the new life which had been infused into German literature by the poetical and artistic genius of the nation. It came from the great mass of novel but unsystematic thought which was accumulated by the classical representatives of German poetry, and which found its expression in their works of lasting value.

Before we dwell on this new and invigorating element,—which it is difficult to define, but which nevertheless has wrought the marvellous change which has come over philosophical thought during this century,—it may be well to realise the geographical distribution and localisation of philosophy since the age of Leibniz, the homes and the wanderings of the speculative mind.

Leibniz was a native of Saxony, and passed the greater part of his life in Northern Germany, in Hanover and Berlin. Wolff and the principal representatives of the "Aufklärung" belonged to the same country. Lessing likewise came from Saxony, and lived very much in the same districts which had been frequented by Leibniz. With the whole body of thought, which was represented by Leibniz and Lessing, Kant was, however, only distantly and imperfectly acquainted. He lived secluded in Königsberg, and though trained in Wolff's school he early became acquainted with Newton's natural philosophy. Herder was likewise a native of East Prussia,

and came early under the influence of Kant. This North German, Saxon, and Prussian culture was only one side of the new life. Distant and independent of it, the south and west of Germany produced and nursed the poetical genius of the nation. Haller and Lavater came from Switzerland, Wieland and Schiller from Suabia, Goethe from the Rhine. These two comparatively independent currents met in the centre of Germany, in Jena and Weimar. Herder represented there the true Leibnizian spirit, though freed from the trammels of the system; Fichte the Saxon spirit trained in the school of Kant. Schiller and Schelling combined the poetical with the philosophical element, the former being the philosopher among the poets, the latter the poet among the philosophers. Goethe combined all the scattered elements in his own mind, and absorbed them to the extent that they were required for the development of his own genius. His was a creative mind. Among the purely contemplative or speculative minds, Schelling was the first who possessed genuine poetical feeling, and he therefore brought to the great body of Leibnizian and Kantian thought a novel element, that one in which both those thinkers had been defective. He has thus become the centre of a new movement. A knowledge of it is quite as important for the study of modern thought as is that of the principles of Leibniz's philosophy. With Schelling we come upon the centre of a new phase of philosophic thought.

We would step beyond the limits of our subject, and of the space allotted to us, if we entered upon this most interesting phenomenon in modern literature. But Schelling himself has very frequently, especially in his 'Ideen zu einer Philosophie der Natur,' 1797 (Works,

vol. ii.), referred to Leibniz, from whom, nevertheless, his philosophy differs so radically, that a discussion of the character, spirit, and aims of Leibniz's thought cannot end without pointing to this most remarkable development of Leibniz's system, which can with equal justice be called a reaction against its extreme individualism. Schelling says of Leibniz: "The first idea from which he started was, that notions of external things spring up in the soul in virtue of its own nature as in an independent world, as if nothing existed but God and the soul. He still maintained in his last writings the absolute impossibility that an external cause can act on the inner essence of a mind,—maintained, in fact, that all vicissitudes, all changes of perceptions and conceptions in a mind, could only emanate from an inner principle."

It will at once be felt, when Leibniz's central idea is expressed in such words, how unsatisfactory it must be to one who is impressed, not with the mechanical order, but with the moral, poetical, and religious significance of this world and all things contained in it. For he will emphasise the unity and interdependence, rather than the individuality and independence, of all real things, and most of all of those endowed with mind. He will not be satisfied with a system which dissolved the world into an infinity of microcosms, between which the only real connection is the intellectual order in the mind of their Creator; and he will be rather in danger of falling into the other extreme, the pantheism of Spinoza. Whether these two extremes can be successfully avoided, or whether it is the fate of all those who speculate to be either individualists with Leibniz, or pantheists with Spinoza, is a question well worthy of careful examination.

The time is past when the world believes that the

mystery of existence can be solved by any splendid divination or any grand intuition. We can say with a great thinker of our days, Herrmann Lotze: "After so lengthy a historical development of philosophy, there exists no merit of originality, but only that of accuracy." But in what way have we to understand this accuracy and minuteness of examination? Not otherwise than as Leibniz did. Whoever claims to contribute to the solution of the philosophical problem of the day, will have to understand and handle it in the spirit of that great thinker. He will have to conceive the problem as the reconciliation of different ways of thinking, as the unification of knowledge, or as the attempt to bring unity and harmony into the scattered trains of thought, which are supplied to us by the sciences on the one side, by practical life and its pursuits on the other. He will be fitted to assist or to succeed in this work in the same degree as he is able to enter into the peculiar aspects of thought, which the different sciences or practical interests have established for themselves, and through which each has reached its present advanced stage of development. He will have to possess that love of method, but likewise that universal sympathy with all human endeavours, which was the great characteristic of Leibniz.

It would be easy to collect together many names of English and foreign thinkers who, consciously or unconsciously, are actuated by this spirit, and are contributing to the solution of the great task. None of them probably accepts the final positions contained in Leibniz's philosophy. Since his time the field of observation has grown much larger, but our view has extended more in depth than in width. Things which seemed plain and simple in the age of Leibniz have become

complex, and have revealed a mystery and significance then undreamed of. To express it in the language of Leibniz, the region of indistinct thought, the great half-illuminated storehouse of the soul, has played a greater part in modern thought and life than the system of Leibniz would credit it with. To many it has and holds the key to man's place in the totality of things. Many believe that, in the depth and retirement of his own soul, man is in immediate *rapport* with the centre and living essence of all things, and they derive all moral, poetical, and religious inspiration from that belief. This was the leading idea of Schelling when he wrote the words: "In all of us dwells a secret wonderful power, that of retiring out of the changes of time into our own innermost selves, freed from everything that came from outside, there to behold the Eternal under the form of immutability. Such intuition is the innermost and most real experience on which all depends that we know and believe of a spiritual world." [1]

It was not the opinion of Schelling, as it was of Spinoza before him and of Hegel after him, that we are capable of translating into some logical or dialectic process this flight of the soul from the temporal and finite to the eternal and infinite. We do not admire him the less for that reason; and it is well to note that he, as little as Leibniz, though for different reasons, left a finished system of philosophy.

Nevertheless it is safe to predict that the human mind will not rest long contented with the mere testimony of those who have come under the influence of that higher power, and count themselves among the inspired. To him even who is fully and practically assured of the

[1] See Schelling's Works, vol. i. p. 318.

existence of this spiritual life and intercourse, there will still remain the desire to see a harmony established between this inward testimony and the great mass of external evidence which seems so frequently to contradict it. For him the conviction will be equally sacred that there is a reason and meaning in everything, and "that the ultimate nature of the real, which includes our own minds, has only imposed upon us such necessary thoughts as are in harmony with it." [1]

With this conviction within, the philosopher can approach his task in two distinct ways. Allowing that all knowledge is merely subjective or relative, he may nevertheless desire to examine more minutely than the theory of science or the practice of life is wont to do, what is the real meaning which we desire to express by the general terms with which we describe to ourselves real events or reflect upon them. He will not have to go very far in order to find that the simplest words, as we employ them in harmless confidence, contain contradictions which make them ambiguous, and import serious difficulties and troubles into our investigations. In order to become clear and thinkable, the notions to which they refer must in fact be changed or remodelled, curtailed or amplified, as the case may be. The result will be a set of fundamental or metaphysical notions. They will differ from those which we trustfully receive through the general usage of language, and which bring with them the concealed contradictions which reveal themselves usually at the end of our analysis. This first and formal task has been clearly defined by Herbart, and has after him been handled with remarkable suggestiveness by Lotze. It is needless to point

[1] See Lotze, Metaphysik, p. 183.

out how closely such an undertaking agrees with the intentions of Leibniz.

But there is a second and equally important task before the philosopher of to-day. The range of external observation and of scientific truth, based upon the mechanical connection of things, has increased so much since the time of Leibniz, and has advanced so much by following the lines pointed out by him, that nothing need be said in recommendation of exact research. But the external signs and evidence of the central spiritual power which lives in the human mind—owing to which Leibniz conceived it as a microcosm in the macrocosm—have grown to a still greater degree. Now, although we may think it impossible to reach, by pure thought, to an adequate or useful expression of that spiritual unity, of which the moral, poetical, and religious phenomena are the outcome, there exist in the history of mankind, and in the life of every individual, numberless events in which the working of the spirit manifests itself. These the philosopher has to look upon as facts, not to be judged by some preconceived standard, or explained away for the benefit of a purely mechanical theory of things, but in the true Leibnizian spirit, with the desire to find out what is the peculiar character and essence of that central life which they exhibit. In this sense Lotze has written his great work, 'Microcosmus,' and he has done this in conscious recognition of the beginning made by Herder in his celebrated 'Ideas towards a History of Mankind.'

END OF LEIBNIZ.